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American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

JANUARY 1921

Vol. 12—No. 1.
10 Cents the Copy
\$1.00 Per Year.

A Friend in Need

*Easier Than Sticking on a
Temporary Cold Patch*

Quicker Than Changing Tubes

The Shaler 5-Minute Vulcanizer makes permanent, heat vulcanized repairs that will not come off—stronger than the tube itself. No cement—no gasoline—no flame. Simple, sure, safe, satisfactory. Over a million motorists carry this convenient "Friend in Need" in their cars to protect themselves against the annoyance and delays of puncture troubles.

Complete **\$1⁵⁰**
Outfit

At All Auto Supply Stores

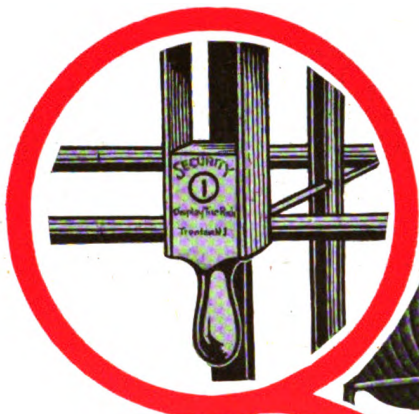
The outfit includes the vulcanizer—12 Patch-&-Heat Units (6 round for punctures, and 6 oblong for cuts) price complete \$1.50. (Slightly higher west of the Rockies and in Canada.) Extra Patch-&-Heat Units 75c a dozen.

C. A. Shaler Co.
350 Fourth St., Waupun, Wis.



Security Display Tire Rack

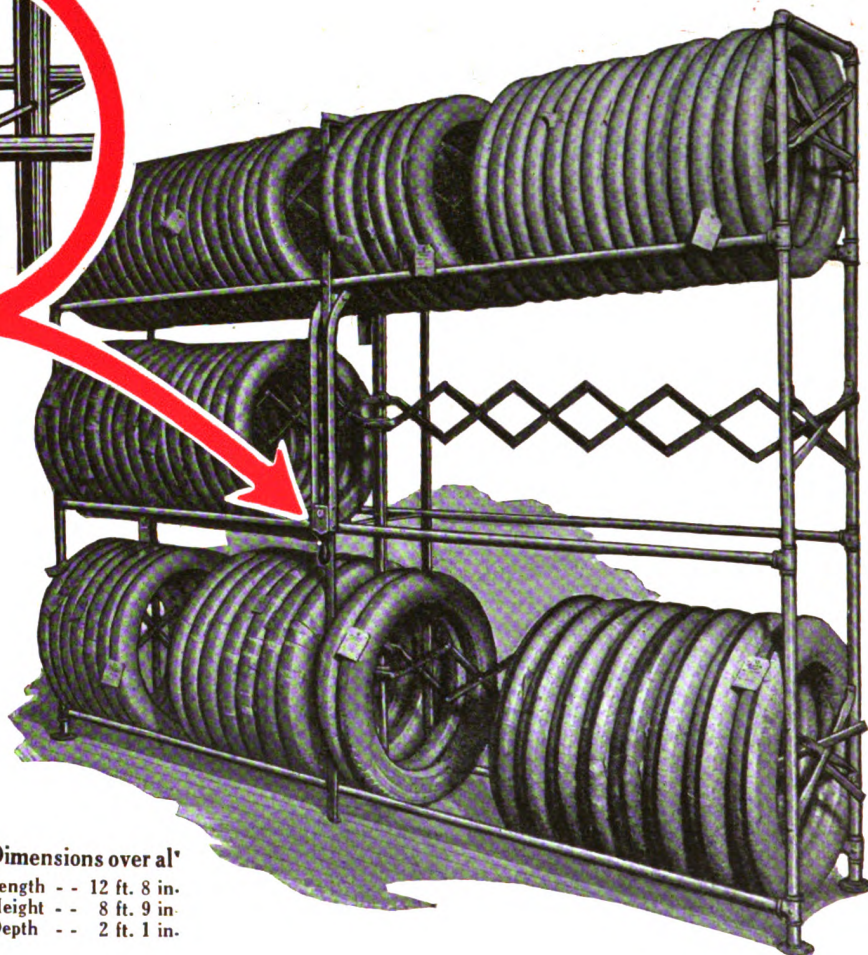
GUARDS STOCK—SELLS TIRES—SAVES SPACE



The Security Display Tire Rack enables you to exhibit your tires in a neat and attractive way. No more dark corner or back room show places necessary—it keeps your tire stock "ON DISPLAY".

Not only does the Security Display Tire Rack boost your tire sales, but it puts a stop to all losses by theft; by damage; by depreciation. Oil, gas and dirt injure tires—the Security Display Tire Rack keeps your tires off the floor, free from all damage. All tires rest upon the tread, having two points of contact, keeping them in perfect shape at all times.

Dimensions over all
Length - - 12 ft. 8 in.
Height - - 8 ft. 9 in.
Depth - - 2 ft. 1 in.



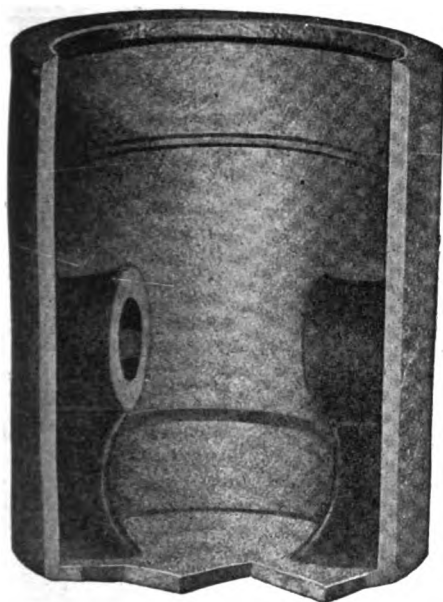
The Security Display Tire Rack is of all steel construction and is backed by an ironclad guarantee. It is simple, yet positive in action. One operation only is necessary in opening or closing rack. To open, simply raise lever arm which draws the lazy tongs to a closed position, allowing any tire on the rack to be lifted out. The arm when raised is six feet four inches (6' 4") from floor, giving ample clearance on all sides. The handle is equipped with Yale Spring Lock, which locks the arm securely to frame of rack. Absolute protection against loss.

The Security Display Tire Rack will be your biggest tire sale booster for 1921, as well as insurance against losses of all kinds. You owe it to yourself to learn more about our offer.

Let us tell you all about it

THE W. J. SMITH COMPANY
1834 BROADWAY -:- NEW YORK, N. Y.





MARCO— The PISTON SUPREME

It's Not How a Piston Looks—It's How It Acts That Counts

Marco reputation is built on performance. They are made of selected, close grained grey iron of the best quality and in accordance with the specifications of the Society of Automotive Engineers. Every item entering into their construction is tested—each charge in the cupola is chemically analyzed. The side walls are light but substantial—they are reinforced underneath the head and around the base. MARCO Pistons are as light as practical, as strong as required to give excess of power, range and flexibility.

MARCO ON PISTONS IS AS STERLING ON SILVER

There may be other Pistons but there is only one MARCO—unapproached—unequalled. Do away with Piston troubles, use MARCO Pistons. Loss of compression, fouled spark plugs, piston slap, sticking, excessive pumping of oil are unknown with the MARCO.

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We are in position to render prompt service on Marco Pistons. We have patterns for 2,500 makes and models of internal combustion engines—from motorcycles to trucks. Marco Pistons are furnished in the rough, semi-finished or finished to the following standard oversizes: .020, .031, .046, .062.

Write for our latest pattern list at once.



*The Sign of a
Perfect Piston*

MARVEL MACHINERY COMPANY

510 Loan & Trust Building
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*The Sign of a
Perfect Piston*

NEW ERA

"Better" SPRING BUMPERS

Start the new year with the determination to carry no dead bumper stock on your shelves.

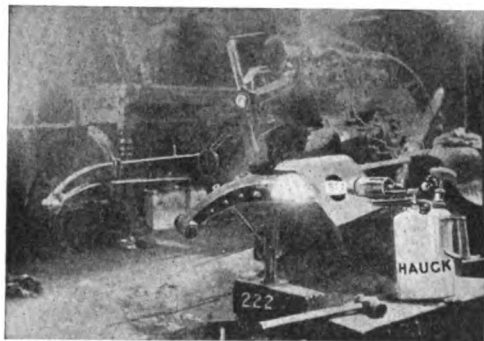


Specialize on New Eras and make every dollar of your bumper investment yield the right profit and quick turn-over. You can do this because New Eras are interchangeable for all cars. Only attachment arms are different and these we will exchange without cost to you.

Remember, the double bar New Era is the right bumper, front and rear for all cars. Light, neat, double strength, maximum protection for your customers, prompt deliveries, quick sales, constant turn-over, and liberal profit for you. Write for catalog of Better Spring Bumpers, Springs and Tire Carriers.

New Era Spring & Specialty Co.

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A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

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A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

The Message of the Shows.....	9
Optimism and Work	9
Dress Up Your Windows.....	10
An Expensive Lesson.....	10
Quality and Service.....	10
More Roads	10

GENERAL

Chicago Show—The Automotive Tonic.....	11-12
New York Slaps Big Business on the Back.....	12
Winter's the Time—To Sell Tractors, by K. H. Lansing	12-14
Battery Trouble? Go to Law About It, by J. E. Bullard	15-16
It's a Way They Have at Welbon's, by Felix Koch..	17-18
Some Exempted Classes of Employees, by Chesla C. Sherlock	19
Say, Are You a Member of the I. T. A's?, by Frank Farrington	21-22
Helpful Hints for Here and There, by F. H. Sweet	22
The Use of the Lathe for Drilling, by J. N. Bagley	25-26-27-28

DEPARTMENTS

Accounting, by J. Newton Boddy.....	23-24
Welding, Cutting and Brazing Practice, by David Baxter	29-30
Readers' Questions and Answers	34-36
Accessories—Dealers' Key to Profits.....	38
Practical Hints for Shop.....	42-44
Up-to-the-Minute Garage Equipment.....	48-52

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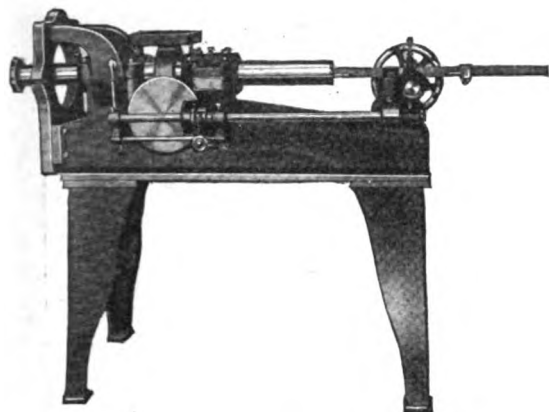
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MARVEL— SERVICE



Marvel Cylinder Re-Boring Machines

SERVICE That is the big word for 1921. Never in the history of business has the demand for real service been as great—

Service that not only saves time and money but gives the utmost in satisfaction and results.

Thousands of Automobiles—in every section of the country—in every locality—will require over-hauling—will demand everything from a change in spark plugs to re-boring of Engine Cylinders.

Marvel Cylinder Re-Boring Machine Gives Real Service

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Marvel Business Building Service

Real dealer helps that bring business to your shop and establish you as the leader in your line. A campaign of advertising for your use that is the last word in direct selling.

Learn about the MARVEL today. Get complete information regarding the latest improvements. Send all inquiries and orders direct to the manufacturers.

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MINNEAPOLIS, MINN.

BRUNNER

To Meet A Certain Condition

In the cramped quarters of oil stations—small vulcanizing shops or tire and accessory stores, the hum of gears may be objectionable. If so, a belt-driven, ultra-quiet, compressor outfit is the natural choice.

BRUNNER engineers have met this need by developing a special model.

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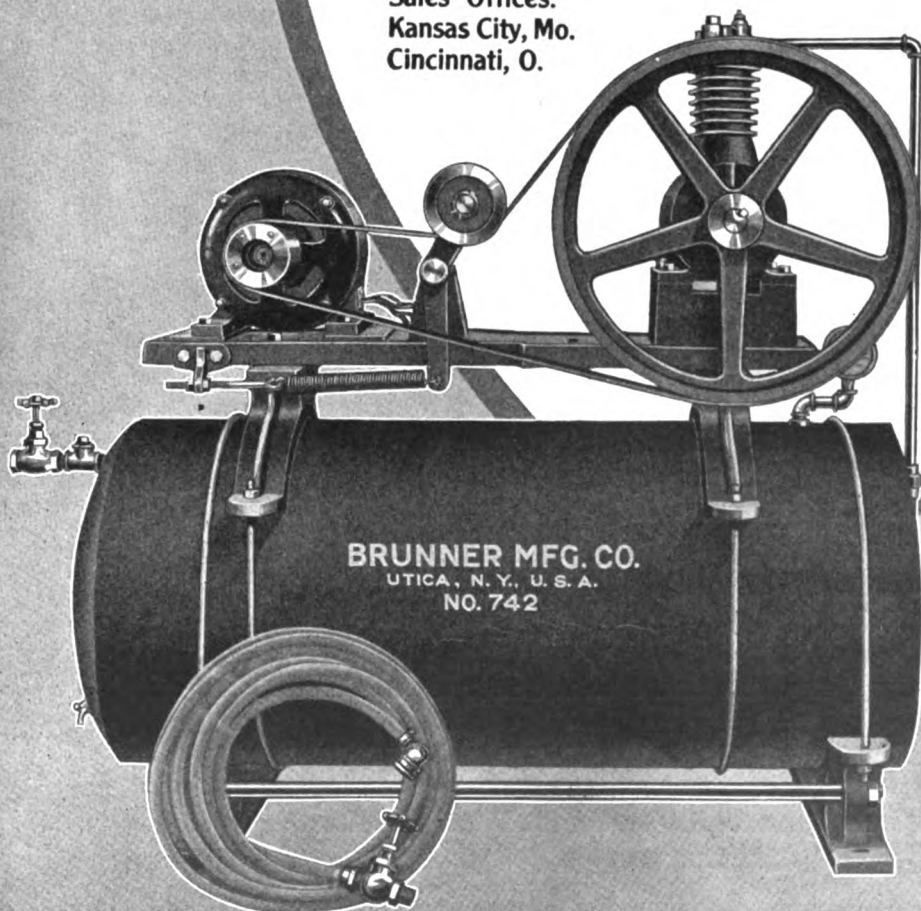
Write to-day for new catalog showing complete line of BRUNNER compressors and outfits.

Brunner Manufacturing Company

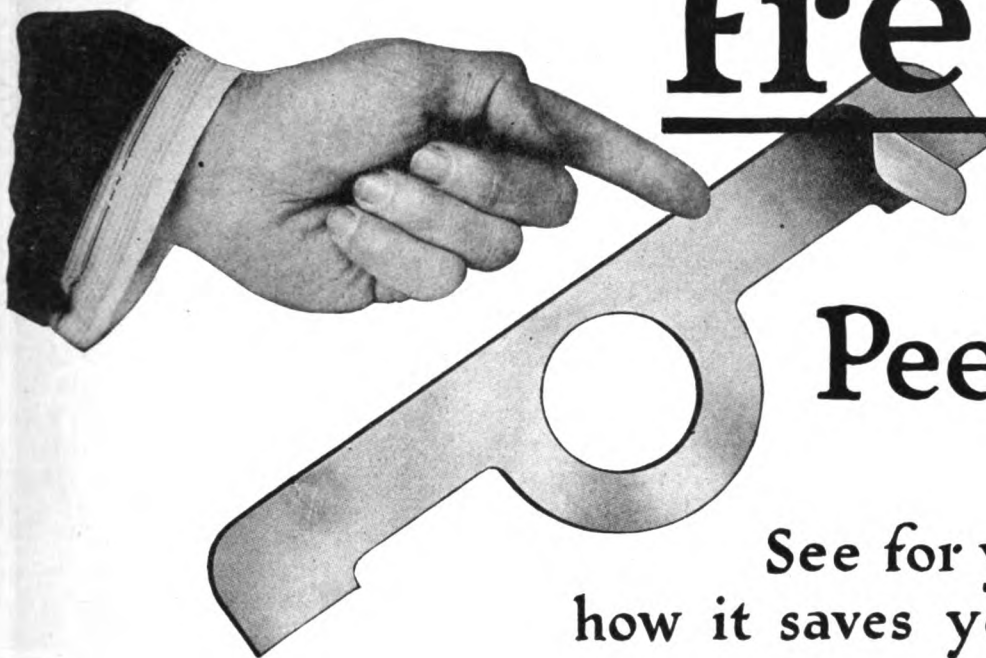
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Put your air
problem up
to Brunner.



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Peel it!

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how it saves your time

A Laminated Shim is made of layers of shim brass .002 and .003 of an inch thick, united by a metallic binder. To secure any desired thickness it is only necessary to peel off the layers with a knife blade. A better job in less time means more money in your pocket. Stock shims for standard bearings, or Laminum in sheets 6 x 36 inches.

Write for sample shim to-day to

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Detroit: Dime Bank Bldg. St. Louis: Mazura Mfg. Co. Chicago: 1118 S. Michigan Ave.

LAMINUM



Now Is the Time to Introduce SPEE-DEE

Every man who drives a car has to stop once in a while to make some adjustment that leaves his hands soiled. In cold weather the use of gasoline or water to wash up afterwards means chapped or cracked hands. In such a case, a can of SPEE-DEE is positively invaluable. This compound

Cleans Greasy, Grimy Hands with or without water

and without injury to the skin. This feature makes SPEE-DEE indispensable in winter, and the man who is acquainted with it always carries a can when driving.

NOW is the ideal time to introduce SPEE-DEE to your customers. Any car owner will buy a can *at this time of year* when you show him how it will clean grimy hands without water. The man who purchases a can for the first time will find it useful for so many purposes that he will be back—again and again—for more. The price is so moderate that the user gets Big Value for his money.

SPEE-DEE is unexcelled for removing spots from clothing and has many household uses. See label.

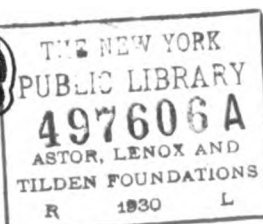
A SPEE-DEE dealership carries with it a steady, profitable business.

Write today for full details or dealers selling helps.

STATES CHEMICAL COMPANY
680 W. Austin Ave. Chicago, Illinois



American Garage & Auto Dealer



Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 1.

CHICAGO

January, 1921

The Message of the Shows.

Automobile shows, of which the two most important are those held in New York and Chicago, are expected to arouse activity among the buying public. In past years, the automobile show has developed many prospects, but the dealers did not take full advantage of the opportunities presented, owing to the fact that cars were difficult to obtain and that they received orders for them without any effort on their part.

This year selling effort will be a feature of all shows. Every visitor will receive attention, for every exhibitor realizes that stimulation of the buying public is urgently required. The shows offer excellent opportunities for stimulation of the buying desire and every advantage will be taken of it.

The New York Show had an excellent opening and it is believed that good results were produced by it. The Chicago show is expected to make a much better record than the New York event for the reason that the great Middle West has not been so hard hit by the business depression as has the East. The Chicago Show, moreover, coming as it does the latter part of the month, receives the benefit of the encouraging developments of the first four weeks of the new year—and they have been good.

The New York Show developed that there is not an excess supply of cars, and that the cars now on hand and in production will not long with-

stand the tide of buying which is now developing. In fact, it is confidently predicted that there will be difficulty in obtaining cars enough to supply

When you would make sales let the customer do a good deal of the talking. Be ready, however, to present your own side of the case at the psychological moment, but do it in as FEW WORDS as you can. Don't use any round-about arguments, involved sentences, and big words. Short sentences, clear ideas and faith in your own proposition, will convince. REMEMBER, COMPRESSION GIVES POWER; EXPANSION DISSIPATES POWER.

the demand as the spring months approach.

And here is the message of the shows—Be optimistic and neglect no opportunity to cultivate a possible buyer. "The business is there!"

Optimism and Work.

With the turn of the year, the plans and ideas of the automotive industry are crystalizing into action. Each day the press dispatches in the newspapers tell of automobile factories resuming production or give definite dates upon which some will resume—and the motor factories are not the only establishments resuming operations. Manufacturing of all kinds is beginning to get under way.

On every hand there is a feeling of optimism. Everyone is looking forward to a period of increased activ-

ity and preparing for it in every way.

It is realized that the days of "easy selling" have passed. No longer are cars and accessories to be disposed of through the sheer insistence of the buyer that he must have them. The prospective buyer has become coy and dealers must exercise real salesmanship.

Salesmanship embraces many things. It includes personality, courtesy, service, carefully-prepared displays, the going after and following-up of prospective purchasers—in fact, the exercise of all that is covered under the heading of scientific merchandising and modern sales effort.

In the year just closed approximately 1,900,000 cars were produced and it is believed that in 1921, the production will equal and probably exceed this figure. Conservative estimates of the market for new cars this year develop the fact that there should be a demand of at least one million cars to replace the cars which have outlived their usefulness. By some, this number is estimated as high as one and one-half million cars.

It is also pointed out that the market for the lower-priced cars will not be as great this year as in past years owing to the fact that these cars were largely purchased by mechanics and other workmen who were enjoying high wages. With wages being cut on all sides, it is quite likely that this class will not purchase as heavily as in the past. The sales, therefore, will be made to people enjoying larger in-

comes and who desire the moderately-priced and better grade cars.

But everywhere the hard-headed, shrewd automotive man is optimistic and looks to a good year in 1921.

Dress Up Your Windows.

"Window dressing," recently stated a business expert, "has been a neglected art with most stores and it is little wonder that the average store gets such small pulling power from people who walk by. It stands to reason, of course, that if a merchant doesn't keep fresh merchandise, he can't very well dress up his window with fresh goods. Just as much taste and originality can be shown in the small display as in a big one."

In window dressing and in general merchandising, there is no occasion for the small concern to ape the work of its larger competitors. There are features of one successful business that can be incorporated in the plans for operating others. But it does not do to follow the leader too closely, especially where there are advantages obtained in one case that are not possessed in another.

A good window always attracts attention as many automotive dealers have found out. It pays to change the displays and vary the arrangement. Let the passer-by know that you have a stock of accessories and supplies; also that you carry standard lines—the nationally-advertised accessories that have a reputation for quality.

An Expensive Lesson.

He was a good mechanic and when he had an opportunity to purchase a garage business at a low price, he took it. The garage building was rented, but the new proprietor did not worry about the monthly rent for a number of cars and trucks were kept in the garage by their owners.

After he had operated the garage for some four months, he had his books gone over by an accountant. To his great surprise, the accountant reported a loss of just about \$1,600 in the four months' time. This the new

garageman could not understand, for all repair work had been billed at a figure above its cost, all accessories and supplies had been sold at a good advance over cost, and his rent was taken care of by the money received from the storage of cars and trucks.

"Why," said he to the accountant, "I couldn't have lost \$1,600 for I get enough from the storage of these cars and trucks alone to pay the rent."

"But," replied the accountant, "that amount does not pay for the heat, light, and your night man. You

Every time you approach a customer, just say to yourself: "This is my first, last, and only chance to do business with him." This will help you to concentrate and to throw so much of your best into the transaction that you will win friends as well as customers.

have not taken any count of your overhead."

It was rather an expensive lesson, but now this garageman knows all the items of cost which enter into his business—and he is making a study of his books with the aid of the accountant who sees him often.

He appreciates the value of accounting and what it can do for a business. His rule now is "Watch The Losses—and then stop them."

Quality and Service.

During the recent breathing spell—the so-called depression—the industry has had opportunity to look around and think over things. We benefit from past experiences and make our mistakes count towards paying dividends in the future, so stopping to take stock of conditions is profitable.

Conditions have been abnormal in the automotive industry as well as in other industries the past few years. The constant cry has been for greater production — quantity ruled rather than quality as many purchasers have discovered.

Some manufacturers allowed materials and workmanship to go into their products which did not do them credit,

while service was a forgotten word. Quality and service now are taking first place in the spirit of factory management and results are being reflected back into the field.

People in buying are now looking for quality consistent with the price asked. The mad orgy of spending is over as is indicated by the increase in the savings bank deposits the last few weeks of last year. But people want automobiles and everything that goes with them. The desirable prospects are those who increased their savings accounts—and they will buy when assured of quality and service.

The manufacturers are improving quality and service—and so are the dealers. Quality and service are fundamentals for successful business relations between customers and automotive dealers as well as between dealers and manufacturers.

Co-operation of every one engaged in the industry—each doing his own part well and helping the other fellow a bit—will do much to place quality and service in the automotive industry on such a high plane that the public will have the greatest confidence in it.

More Roads.

Costs are coming down according to reports on commodities and also from manufacturing centers. There is unemployment, wages are being reduced and labor is becoming more efficient.

These factors have an influence on the building of roads, for in the past year costs were so high that but little road-building was done. Now, however, road-building is being urged to help take up "the slack in industry."

The automotive industry is greatly interested in the subject of roads—in fact, automotive engineers are now making a study of highways and co-operating with road-building authorities in order that more durable and more permanent roads may be built.

Every automotive man should be a booster for good roads and their extension. It helps the community and it helps the sale of cars, accessories and supplies. "Be a Booster!"

Chicago Show—the Automotive Tonic

All the Automotive Industry Needs Is a Dose of the Good Tonic of Vim
That the Always Exhilarating Chicago Show Is Bound to Give—Enthusiasm
Roused There Is Sure to Bring the Silver Lining Through the Clouds Again

That indefinable "something," that electric force which makes Chicago the industrial center of vim and vigor that it is—is the great medium which will have its influence on the prospective purchasers at the Chicago Show to be held at the Coliseum, the Coliseum annex, and the First Regiment armory, January 29 to February 5, inclusive.

It is only logical to assume that a city whose everyday life spells action should instill in the visitors to its greatest "show" a similar enthusiasm. Under the whip of the now popular slogan "1921 Will Reward Fighters," salesmen are mustering their energies to swoop down in a big drive on the buying public—and there is every indication that their efforts will be rewarded.

The "buying vacuum" which has been created by the plans of the public to lower prices is bound to break very soon. The present favorable financial conditions, general transportation conditions, and the real need of the public for cars is having a decided influence on every branch of the automotive industry.

One thing is apparent—it is not necessary to create a demand for cars, for it is now an established fact that the automobile is not a luxury, but a necessity in the "scheme of things." All that is needed now is a little strategic urging on the part of sales managers and their corps of workers.

So with all these things in mind, it is predicted that when the prospective purchaser enters the Coliseum

Facts and Figures of the Automobile Industry During 1920

By Alfred Reeves, *General Manager,*
National Automobile Chamber of Commerce.
Automobile Use.

Automobiles registered in U. S. (approx.)	8,500,000
Passenger cars registered in U. S.	7,600,000
Motor trucks registered in U. S.	900,000
Cars and trucks owned by farmers	2,500,000
Percentage of registration in towns of 5,000 population or less	55
Percentage of registration in towns of 1,000 population or less	33
Percentage of 1920 output bought by agricultural districts	60
State-owned cars and trucks	30,125
Municipally-owned cars and trucks	10,314
Trucks owned by farmers	80,000
Labor-saving value of truck to each farmer annually	\$150
Saving in transport charges to each farmer annually through use of truck	\$240

Automobile's Part in Nation's Business.

Amount of special taxes paid annually by industry to federal government	\$257,000,000
Registration fees paid by car users	\$81,000,000
Percentage of all cars used more or less for business	90
Percentage of total mileage used for business	60
Gain business efficiency from use of car as reported by average owner (per cent)	57
Percentage of steel supply used by automobile industry	4
Amount paid by industry to railroads for freight on shipments of finished motor vehicles	\$100,000,000

Production in 1920.

Cars and trucks produced	2,241,000
Passenger cars produced	1,906,000
Motor trucks produced	335,000
Wholesale value of cars and trucks produced	\$2,136,183,676
Wholesale value of passenger cars produced	\$1,703,437,213
Wholesale value of motor trucks produced	\$432,746,463
Average wholesale price of passenger cars produced	\$897
Average wholesale price of motor trucks produced	\$1,273
Motor truck manufacturers in production	170
Passenger car manufacturers in production	90
States in which factories are located	32
Employees engaged in car and truck manufacture	300,000
Automobile tires manufactured	32,400,000
Increase in gasoline production over 1919	19%

Dealers and Garages in United States.

Passenger car dealers	36,210
Motor truck dealers	20,596
Garages	38,538
Repair shops	47,556

or any other of the exhibition buildings in Chicago, the forces of beauty, combined with the sales psychology which will be used to interest and attract him, cannot but have some effect on his buying instinct.

For months, artists have been at work carrying out the plans for the decorative background of the great show. The color scheme this year will be a harmonious combination of green, pink, blue, and yellow tones. Flashes of gold and silver decorations will add to the brilliancy.

Under the direction of Charles J. Tietzel, a series of 28 panels have been prepared to run along the gallery front. These paintings depict the "Evolution of Transportation" in cameo effect. The oxcart, the sedan chair, and the "rubberneck wagon" are there—the spirit of past ages and present ages strikingly presented by the artists.

The ceilings will be hidden by white curtains decorated in tinted scrolls. Two hundred and fifty drop lights with great art glass shades will swing down from the ceilings to supply light for the buildings.

The main floor of the Coliseum will be divided in four sections by groups of pillars made in Italian formation on top of which vases of flowers and ferns will be placed. The decorations of the First Regiment armory will be like those of the Coliseum except the cameo effects of the panels will show passenger and racing automobiles.

Eighty makes of passen-

ger automobiles will be shown at the exposition this month and there will be more than 200 accessory displays. Some of the exhibits will be shipped direct from the New York Show while others will be sent from the manufacturers' factories. The models shown will meet every need—fast cars, slow cars, expensive cars and moderately-priced cars will be presented.

In short, the Chicago Show will be

a convention of every branch of the industry. Dealers, manufacturers, and purchasers will meet to dispense and gather ideas. In such a gathering only can they grasp in a big sense what the other fellow is doing. The show is like the old-time, three-ring circus that gave pleasure while it was going on and something to think about after it was over.

Everybody says the Chicago Show

is going to be a "buying show"—and the indications are that these predictions will be made good. Whatever is done there bears influence on the entire Middle West for which it is spokesman. One thing is very certain, however. It is that both the practical and the artistic devotees of the automotive industry will each find a full measure of satisfaction at the Chicago exhibition.

New York Slaps Big Business on Back

The Industry Will Be Cheered by Enthusiastic Reports From the New York Show—"They're Buying, Not Just Looking"—Everything Indicates That This Exhibition in Points of Beauty and Business Done Will Be a Record Breaker

The New York Passenger Car Show opened with a bang on January 8 at the Grand Central Palace and as we go to press with this issue, all the optimistic predictions made concerning the show during the last few months are being fulfilled.

New cars are making such a strong appeal that buyers who have been holding off to see the latest models are placing orders and making deposits on early Spring deliveries.

"Sales are being made" are the words which are bringing cheer to manufacturers and dealers who have regarded the New York Show as the turning point for brighter times in the automotive world.

More than 350 models are on display representing 89 makes of motor vehicles. There have been several newcomers to the four and six-cylinder engine types. There has also been an increase in eight-cylinder makes—in short, ten new makes are being shown in the Palace and five new makes are shown in the different hotel lobbies.

The exhibit appears to be well-standardized. Typical show cars have been replaced by models along more conservative although beautiful and artistic lines. There have been few changes in body designs. All are stream-line effect from radiator to rear of the tonneau. An interesting and brilliant display of color in cars, reds and yellows and blues is noted throughout the exhibits.

The Palace itself has been tastefully decorated, in a scheme of green and white. The pillars on the main floor are covered up to a height of 12 feet by a trellis box arrangement entwined with leaves and flowers. The

exhibitors' signs are in raised white letters on a green background.

The first two floors are exclusively used for the automobile exhibitions. On the third floor of the Palace are 22 car exhibits and three on the fourth floor. Practically all of the fourth floor and the greater portion of the third floor is used for enormous displays of accessories. In all, there are 284 exhibitors of motor accessories, nine makes of which have never been shown in New York, most of them entirely new products.

Manufacturers and dealers throughout found visitors at the show exhibiting a real interest in models shown—although probable cuts in prices is easily the chief idea which purchasers have in mind. In fact, so enthusiastic were the crowds that when the big show was closed last Sunday visitors thronged the hotel exhibits to study the features of the new cars.

Manufacturers have little comment to make on the subject, but point out that just lately they have been engaged in cutting down overhead costs in an effort to get down to a point where normal price levels can be reached. Manufacturers also claim that price guarantees made last fall fully protect today's buyers from any possible loss.

The general, almost complete readjustment which has taken place during the last few months has given the buying public a new confidence in products and has prepared the way for a good business boom.

Meetings of all kinds were held during the week. Dealers were present from all parts of the country and many conferences of sales forces took

place. Reports made at these meetings indicated clearly that the field confidently expects the demand for cars to soon exceed the supply—some predicting it within the next month and others not later than early April.

Engineers at their meetings discussed the production of lighter weight cars, body and chassis designs, lower cost of operation and the building of more durable roads.

The first motor car exhibition was held in Old Madison Square Garden in 1900, so this is the 21st birthday of the automobile show. In the early days people were just beginning to be interested in the automobile. What a contrast this presents to the present records which show that the American people are now using more than 8,000,000 motor vehicles throughout the 48 states! About 800,000 of these are motor trucks or small commercial vehicles. It is astounding when one considers to what proportions the industry has grown.

To sum it all up in the words of one of the automotive leaders of today: "You cannot put the automotive industry down. The word automobile is synonymous with transportation. That definition is more true today than ever before. The motor vehicle, whether passenger car or motor truck, is an essential to the prosperity of our national life as steamships and railroads.

"Abnormal business conditions may put a temporary check upon the customary activity. Some concerns, through bad management, may pass out of existence, but the industry, as a whole, has solid and permanent foundations."

Winter's the Time—to Sell Tractors

A Horse Has to Be Limbered Up Before It Does Its Best Work; So Does a Tractor—Dealers Who Sell Now Have a Chance to Teach Customers the Important Breaking-in Process, and Do Some Demonstration Stunts Besides

By K. H. Lansing

If you conduct a garage in a small town and sell tractors, which are increasingly becoming part of the garageman's regular stock, there is no need to wait for winter to end before pushing their sale.

Numerous country-town garagemen are selling various types of tractors this year and, in the East, New Jersey apparently is among the leaders in this regard. When Henry Ford recently issued the ultimatum that all Ford agencies must handle and promote the sale of Fordson tractors, he started something. Many garages that are not Ford agencies saw the wisdom of having a tractor or so for sale, especially when there began to be emphasized the less ordinary uses of the machine, such, for instance, as running the farm lighting system, sawing wood, separating cream, churning, conveying stock feed about, snow-plowing and the like.

In small towns in which there are important industries, garagemen are stressing the various industrial uses of tractors—even the larger types that hitherto have been considered strictly in the category of farm tractors.

While it is not necessarily true that no tractor manufacturers pushed tractors for their industrial uses prior to the promulgation of the Ford idea, it is doubtless true that Ford's "drive" has had a stimulating effect in showing how tractors can be sold when new uses are created, or old uses stressed by repetition and campaigning.

So, in small towns, or villages, where there are foundries, lumber and brick yards, coal pockets and concerns



The "One Man" Type Garden Tractor Makes Effective Snow Plow for Community Roadway.

types, from the so-called garden, or general utility one-man device to the larger types—have been receiving a sales impetus irrespective of the calendar.

It is claimed that the small-town agent, including the garageman, who usually is the agent along with the implement dealer, is doing much toward weaning the farmer from buying his tractor, as late as April, or until the spring season is almost on.

These agents have

been gradually impressing upon the farmer that the practice of waiting until the very last moment before selecting the tractor is one which eventually costs the owner a whole lot of trouble and delay and, besides, has brought discredit upon more than one excellent tractor.

Here are points that should be pushed home by the garageman-tractor-agent, who is really the one closest to the farmer's automotive problems:

Like any other kind of hauling arrangement, whether it be mechanical, or alive, a tractor must be worked in gradually to bring out its full efficiency.

No farmer would think of driving his horses at a mid-season pace after they had been standing for months in the barn. He is aware of their limitations and, accordingly, works them easily for only a few hours, at first, gradually increasing their load and hours of work as their sinews toughen and their wind improves. This method of building up horseflesh has become so much a matter of habit that the

How the Garageman Can Sell Tractors in Winter.

By showing the farmer that it is extremely detrimental to his interests and the machine to wait, before purchasing it, until he is just ready to use it in the spring.

By demonstrating that the tractor has many uses for winter, including clearing roads and sidewalks of snow, transporting feed, churning, sawing wood, hauling logs, running the electric-lighting plant and the like.

By making a "drive" on the industrial enterprises in small towns and suburban localities, demonstrating that the tractor is admirably suited for hauling to and from foundries, lumber and coal yards, steel plants, ice houses and milk depots.

By well-placed and telling advertising showing the foregoing.

If You Follow This Little Program, Mr. Garageman, You Can "Do It."

farmer forgets to apply it to his tractor.

But when the machine gives way to the sudden strain of spring work when used hard for the first time, before it has had even a chance to "sweeten up" in its running, he refuses to consider that he was at fault and blames the tractor and the agent who sold it to him. He is as bad as, or worse than, the man who forgets that machinery is metal and needs oil once in a while.

Even the lesson learned from the first automobile, or motor truck experience, fails to impress some farmers as being applicable to tractors. The garageman, on that occasion, of course, cautioned them to take it easy at first. Some heeded the caution and were rewarded by having a smoothly-running machine of long life, while others "stepped on the gas" from the start—and paid for it.

That this warning should be observed all the more in the case of the tractor is readily understood when it is realized that a tractor motor does more than 20 times the work of an automobile engine in traveling the same distance. If it paid to give the passenger car a thorough working-in, it will pay ten times over to give the tractor like care and attention.

If a farmer purchases a tractor a day or a week before he begins to plow, he will not get from it all the good to which he is entitled when he pays his money. The tractor may even go through that first, hard-worked season without a hitch, but its life has been shortened all the same and in the end the price will be dear for the last-minute purchase. In other words, not the garageman agent, but the farmer, will do the "stinging," for in that case the farmer most certainly will be "stung," just as if he had paid a round sum for a spavined and hamstrung horse.

The time to buy a tractor, the garageman should emphasize to his prospect, is at least a month or two before it is put to any very hard, continuous work. Such a "limbering-up" will make the machine "fit" for the strenuous day when it must work 24 hours virtually without a stop.

Once worked in and properly maintained, the tractor is as far ahead of the horse for most hauling jobs, as a modern steam locomotive is ahead of the old-fashioned stagecoach.

There are many odd jobs which the tractor—either of the "one-man," or

the larger types, can do while the snow is still on the ground, before spring opens up. Each day that it is used in moderation—and the farmer should be told this by the agent—will help to make it an easier-running machine and a more dependable one when it is time for the really heavy work.

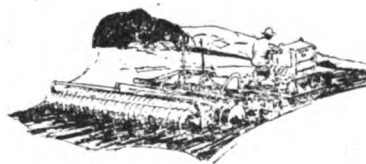
Most woodlots have some fallen timber that should be hauled to the barnyard for sawing. The tractor will do both jobs effectively and quickly

FARMERS, Attention!

Now is the time to order your Cletrac tractor so that you may have it on time for spring work.

The Cletrac Tractor

has proved its endurance and serviceability in all sorts of difficult tests. The Cletrac is in actual use on thousands and thousands of farms.



ADAMS BROS. GARAGE

Cor. Federal St. and Locust Ave., Burlington, N. J.
Phone 36-J

Appeal Directly to the Farmers Through the Newspapers.

and at the same time its gears will be limbered up. Or there may be corn to shred, feed to grind, manure to haul, ditches to run, and roads and walks to clear of snow before the spring thaw.

Indeed, the garageman who has a demonstrating tractor or so in his place of business, can occupy a little spare time in no better way than demonstrating, in the most practical and public manner, how good a snowplow a tractor—even the smallest—can be when it is given the chance.

Odd jobs do two things which insure the successful operation of the tractor in the future. First of all, they acquaint the owner with his machine as nothing but actual use can do, giving him the "feel" of it and developing an "ear" for its distress and satisfaction signals. Second, they give the bearings a chance to work in and help the valves to "seat" more snugly.

They fit the piston rings to cylinder walls more perfectly by this action than the most exact machine can do it, and they limber up every part, much as the first days of light labor take the "kinks" out of a horse's shoulders and legs.

Another use which the garageman may make of his demonstrator-tractor, especially if he is known to do much towing in his community, is to use the tractor to rescue automobiles and motor trucks, or horse-drawn vehicles stalled in the snow. Provided this job, which, of course, is apt to be somewhat strenuous, isn't overdone, the garageman will benefit from the publicity attending the operation. There is nothing to prevent suburban, as well as farm country snow-plowing and rescuing of stalled automobiles, trucks and rigs on the same plan by enterprising garagemen.

One garage concern in a small town in New Jersey—Burlington—has been a leader in its community in this sort of educational campaign in the farming and suburban districts. This house, Adams Brothers, has sold as many as 14 tractors in a few months within three miles of Burlington and addresses its advertising direct to the farmers, sometimes taking double-column display space, showing a cut of the machine.

"In many cases," said a salesman, "it is not a wise policy to tell a farmer, when you are demonstrating, or talking about a tractor, that you have something to supplant his horses. In the first place, he is not apt to believe it, for the reason that he has his own opinion of what a tractor and a horse have as their limitations and capabilities and nearly all farmers stick to at least one team, no matter how far their farm equipment may be motorized. They seem to have a pet theory that for some kinds of work on wet ground nothing can beat a team.

"In the second place, not a few farmers have a positive affection for their horses and resent any talk about 'supplanting' them. That word, or its intent, to such as these is an unfortunate selection. Say, rather that your device will supplement, or augment his horses, even though you may have it in the back of your head eventually to get him to motorize his entire equipment."

Of course, the farmer can always be reminded diplomatically that a horse will lose half a day in resting after a hard pull and that after even the most strenuous work, once a tractor has been "broken in," half an hour's care will put it in shape for another 12-hour stretch, if need be.

Walter M. Peacock, who handles small tractors in Bridgeton, N. J., uses

(Concluded on page 24.)

Battery Trouble? "Go to Law About It"

Most Folks When They Have Trouble with Their Cars, Do Not Think of Going to Law About It—But in Providence, R. I., They Have That Habit, For Law Happens to Be One of the Most Satisfactory of Service Stations

By J. E. Bullard

The motorist driving into the city of Providence, R. I., will notice large painted bulletins, conspicuously located, which advise him to "Go to Law about it." The left end of the bulletin is taken up with a large picture of a judge. Across the top of this unique sign runs the legend: "Battery Trouble? Go to Law about it." Below, come the words "William Law Co., 123 Aborn St., Providence." A picture of a storage battery at the right bears the name "Law," and at the bottom there is a line reading "We make it so we can guarantee it."

Perhaps as he drives along the road entering Providence, or after he has reached the city streets, he will meet a Ford truck with a red enclosed body bearing across its rear end in large letters, "Go to Law about it." This is the service truck of the William Law Co. on its way to render service to some motorist who is having some sort of electrical trouble with his car.

Before the motorist has had his attention called many times to the fact that he ought to "Go to Law about it," he becomes interested and curious. He wants to know what kind of man this Law is. And curiosity has its value as an element in business building because most of these people once having gone to the Law service station, have at least a little work done there.

"We have not always," said Mr. Law, "featured our name in the same way in which we are featuring it today. When we started business in 1913, it was the name of the manufacturer which we made prominent. Our own name was printed in very small letters. We did not use it as a business getter."

His experience has thoroughly convinced him that it pays a concern to feature its own name and to make it stick in the minds of customers and prospective customers as thoroughly as possible. This gives the firm a good

that it has been, has resulted in an immense selling power. It has made it possible to attract customers who would not be drawn to the concern if some less effective means of attracting their attention was relied upon.

"Our company was established in 1913," Mr. Law stated, "and we repaired magnetos, generators, motors and batteries."

In those days the only car that was fully equipped with batteries, self-starter, lighting system, and the like, was the Cadillac."

Its first station was located at New Bedford, Mass., and the company became

agent for the Willard batteries and the Bosch magneto. Later Willard service stations were established in Fall River, Mass., and Pawtucket and Providence in Rhode Island. All these branches have since been sold and the business confined to the Providence station where the company gives a complete electrical service to car owners and also makes its own batteries.

The experience of the William Law Co. certainly has answered the query, "What's in a name?" It indicates that there are a great many other concerns that might find it profitable to feature their names.

Sell the idea of the firm to the public and they are more likely to patronize that firm. If a concern is agent for but one manufacturer it, of course, is possible to rely to a very great extent upon the name of the manufacturer and the advertising and sales work done to attract customers. But when the agent establishes a good reputation, still more people are attracted. The manufacturer alone cannot do it all—the dealer must do something.



A Motorist Who Sees This Sign Couldn't Do Otherwise Than "Stop, Look, and Listen."

standing with its patrons and brings business to it that otherwise would not be secured. The commercial value of an established name is well known.

The happy thought of incorporating a name into a slogan in the way



Mr. Law Had a Happy Thought When He Incorporated His Name Into the Slogan.

There is also another advantage in fixing the name and the policy firmly in the minds of the public. It may happen that the manufacturer goes out of business. His concern may be combined with some other and lose its identity in the process. New men may gain control and the policy change. There are a number of things that

looked the fact that his article was not quite as good as those whose names were worth so much and that he had not spent as much money in popularizing his name.

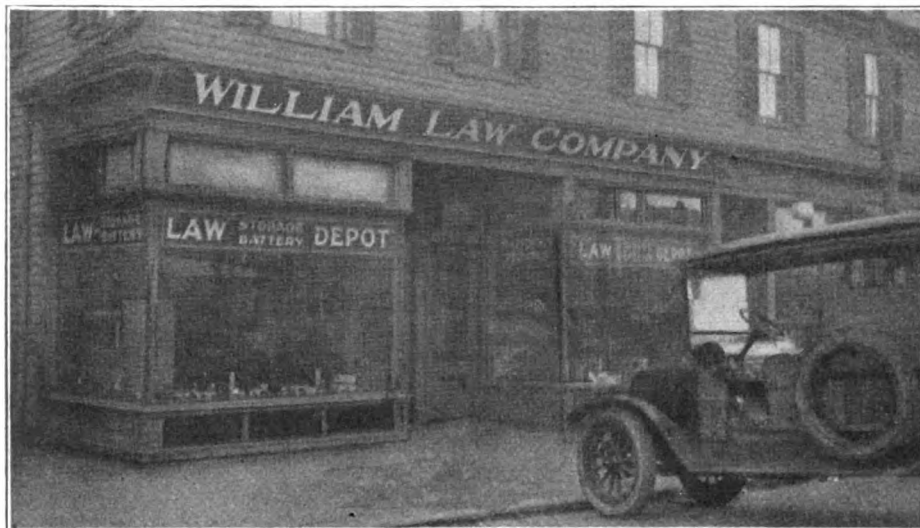
The William Law Co. has not made this mistake. Having advised the people to "go to Law about it," every effort is made to give them considerably

to pay any more than they have to for any service that is rendered.

The company naturally does more business in battery service than in any other branch, but it is equipped for and renders service on all electrical equipment from the tail-light to the headlight. Any generator, motor, or magneto trouble can be given expert attention. Batteries are charged, repaired and stored; magnetos are re-magnetized, provided with new brushes, and put into the best of running condition.

The very slogan that the company uses makes it necessary to pay special attention to service and satisfying customers. The slogan gets people to make one visit to the service station. It, however, may also act as a boomerang. There are a lot of people who believe that it is not a good idea to "go to law" about anything, if it can be avoided.

The novelty of going to Law about electrical trouble may cause them to go there once, but if the service is not all that they expected, they are going to be convinced that they were right when they first decided that it was a bad thing to go to law about anything. The importance of the very best service and an extra effort to please customers when a slogan that attracts them to the place of business is used, therefore, is apparent.



Although the Law Establishment Is Not An Imposing One, It Is Equipped for Service.

may happen to cause a dealer, service station owner, or agent to find it advantageous to change manufacturers.

If the name and the policy of this dealer, service station owner, or agent has not been sold to the public, it becomes necessary to begin all over again. If it has been thoroughly sold, the proprietor can go right on from the point where he left off and he becomes a very much better representative for the manufacturer than would otherwise be the case. It works out, therefore, both to the advantage of the manufacturer and the proprietor.

Of course, merely making a drive on the name, however, will not accomplish the desired result. It is necessary to have something back of it. A certain man had an article that he wanted to sell. He had read about the millions of dollars' valuation which had been set upon the trade names given to old established and advertised articles. He decided that it would be well for him to find as good a name for his article.

He kept searching for one until he finally did discover one that, as far as the name itself went, was just as good as the most valuable one that he had ever read about. He, however, was disappointed to find that the name did not sell the article as well as he expected that it would. He had over-

more satisfaction than they would get if they took a case to a court of law. Half of the people who go to law, those who lose their cases, must be disappointed. If they were not, the other side could not be pleased by winning their cases. The William Law Co. is not content to satisfy only half of its customers. It strives to render the service that will satisfy each and every one of them. It aims to make its service such that it can guarantee it.

If a person has trouble out on the road, all he has to do is to appeal to Law about it over the telephone. Soon either the Ford truck mentioned will be on its way with an expert electrician aboard, as well as all the instruments and material needed to help him out of his trouble. If he is a considerable distance from the station, a motorcycle instead of the truck will hove into sight in a surprisingly short time after the appeal for help has been made.

The motorcycle is used for two reasons. First, it is possible to get to the scene of the trouble in less time. Second, it costs only one-fifth as much to operate as the truck. This means quicker service and less expensive service than would be the case if an automobile was used for all service work. In these days of the high cost of living, even car owners don't want

Good Roads Movement to Receive Boost by Congress and Show.

The good roads movement in the United States and Canada will receive a strong impetus when good roads' advocates, several thousand, gather in Chicago, February 9 to 12 for the eleventh American Good Roads Congress and twelfth Good Roads Show to be held at the Coliseum.

The congress and show are being organized in connection with the 18th annual convention of the American Road Builders' Association which embraces in its membership highway officials of the national government and the states, counties, cities and townships in the United States and Canada, together with highway engineers and contractors and the manufacturers of road building machinery, road materials and highway transportation equipment.

The program for the four days of the congress will cover every vital subject related to highways and their use. The prepared papers and discussions will deal with all points of view.

It's a Way They Have at Welbon's

By Combining Distinctive Displays and the Most Comprehensive Sales Methods—And Not a Little Sales Psychology—to Win Customers from All Parts of the Country to Their Rather Unique Automobile Showrooms

By Felix Koch

This is the story of how one man in the Mid-West is building a business which, originally purely local, has branched out over other cities and then other states, and is now rapidly growing national; all this, very basically, through emphasizing, in the motor-car trade, one big central idea.

This idea, put very briefly, is that a large, inviting, far from over-filled display room, is quite as important in the automobile sales' game as any other factor to be counted there.

Everyone knows that! Well, yes, of course, everyone knows that; and in Cincinnati, where the Welbon concern has its headquarters, there are innumerable automobile concerns which have big, clean, inviting commodious salesrooms; but somehow there is absent just that touch of the artistic, the home-like—the salon, one might put it—which attaches to the chamber where the Welbon cars are on display.

It's the difference you will find between a picture-store and the long, carefully-arranged walls of pictures in the art museum; the indefinable something that gives a lure to the display. As to the value of it—for it implies floor space, and that, in the heart of a big city, which is where Welbon establishes his stores, is expensive—well, let us see:

Within less than two months since, the traveling salesman for a great eastern sporting house happened down Walnut street, in business Cincinnati. This man—Hal Johnson by name—has an international reputation for his sales, and one of the reasons for his selling power is that he is always seek-

ing and always distributing ideas.

Johnson, when he isn't "selling" himself, walks a city's business thoroughfares studying window displays, studying lighting effects, studying the

Hal Johnson stop short and consider.

A store that might be so prodigal with room must evidently have money behind it. A store with money behind it meant a store doing a goodly trade.

A goodly trade must mean satisfied customers. Such a store must be the sort to patronize.

To Johnson's fertile, commercial mind, this proposition presented still another angle.

If a store presented such results as that, it must mean a concern not at all over-difficult to sell for. Johnson believed that there might be other things to sell even more profitable than sporting wares.

To omit the intermediary stages, he was put on the sales force. In a single

day, within two months of the time of his entering the lists there, Johnson sold three cars!

When one considers that the cars handled by Welbon are of two high-grade makes, and that the only other sales are of cars taken in on "trades," what Johnson's record implies can be better imagined than described.

How did he do it? How are the other Welbon salesmen doing the phenomenal business this store has been attracting?

We asked Johnson to answer the question—to give us the secrets of automobile selling as he, still so new at it sees them, in contrast to the other phases of the selling game.

"First and foremost," Johnson put it, "we salesmen here do what we can to make friends—friends everywhere and all the time. A friend is bread upon the water; you can never tell when he will not return.

"Just this week," he illustrated his



There Was a Certain Spaciousness and Airiness About the Salesroom.

way customers are ushered to the door, studying what the street may offer. The lessons learned, he drops in on his own customers as so much manna from commercial heavens, and they reciprocate by buying from him proportionately in turn.

Johnson strolled down Walnut street and he saw the Welbon salesrooms. Great plateglass windows rose from almost the floor to the very elevated ceiling. Mosaic flooring stretched away to where three widely different automobiles, no more, stood awaiting inspection. Off at one side, a chassis was exposed where all who wished might study. At another place a rest-corner was provided for ladies who might wish to see the cars the men of their homes were considering buying; farther to the rear, equally attractive desks were provided for the salesmen.

Somehow there was a certain spacious, airiness, a display of luxury and yet good taste, about it all that made

assertion, "I sold a man I got to know and like—and I've a 'hunch' that he likes me; we were in the army together.

"I saw him standing at a street corner one day as I went by. I might have nodded, or given him a hearty slap on the back, and gone on, but sales aren't made in that way.

"I stopped for a moment's chat; I always do when I can. There came a question as to how things might be going with me. 'Fine'—you always want to let folks believe business is 'fine'; no one wants to deal with a chap who can't get other business. What was it I was selling? I told him, automobiles.

"Then, as I saw a flash of that telltale exhibition of interest, that indescribable something by which a salesman should know that the other has automobiles, to some degree, upon the brain, I quickly struck home with this:

"'Interested or no, I wish you'd step in and see our cars. Won't take you a minute.' And, here is the advantage of the centrally-located display room, even though space is costly: 'It's a most attractive place to rest. Warm as toast in winter; cool in summer—table, chairs, all the automobile magazines.'

"It sounded alluring, and I knew I would deliver what I promised. I always insist on that with any house I serve.

"'How'd you come to go with that particular company?' he asked, as so many prospects ask, before he signified acquiescence.

"'Because I believe they give you the best car for the money,' I answered. And a salesman should believe that of his car or go to selling other line where he may, can and will believe!"

And he told me later, as a lot of them tell me, that just this personal optimism clinched the sale.

That is the Welbon way, making the prospect feel that the seller him-

self is sincere in his belief in the wares. When Welbon can't feel that way about a car, it doesn't go into the Welbon stores!

"My friend," Johnson went on, "was of the kind to whom things had to be demonstrated, really shown—and so I went out and demonstrated, and by and by the sale was made!"

But this isn't only the interesting phase of the art of selling motor cars, as practiced at Welbon's.

Recently the same salesman made one of the best single sales in a long

can drive,' he said. 'Anyone as familiar as you are with that other car can drive this. You just pull down that,' and she obeyed. 'Now kindly turn that.' Although a babe might have driven, as Johnson explained it, the delighted lady was more than pleased.

"They drove ten miles or so, and on that junket Johnson gave all the first lessons required. He used the lesson method of 'Of-course, now-you-know' instead of pure didactic 'Now do this,' 'Now do that,' for he knew that nothing overjoys like success; he gave that woman a full measure of praise at her success. Before ten miles were gone, she wheeled to the curb before a drug store and telephoned Mr. Husband that she had the very car they desired; one she could drive as well as he.

At Mr. Johnson's suggestion, she even added that she would call for Mr. Fabing herself that very night.

"By and by he saw Mrs. Fabing rolling to the curb like a trained chauffeur.

That night, John-

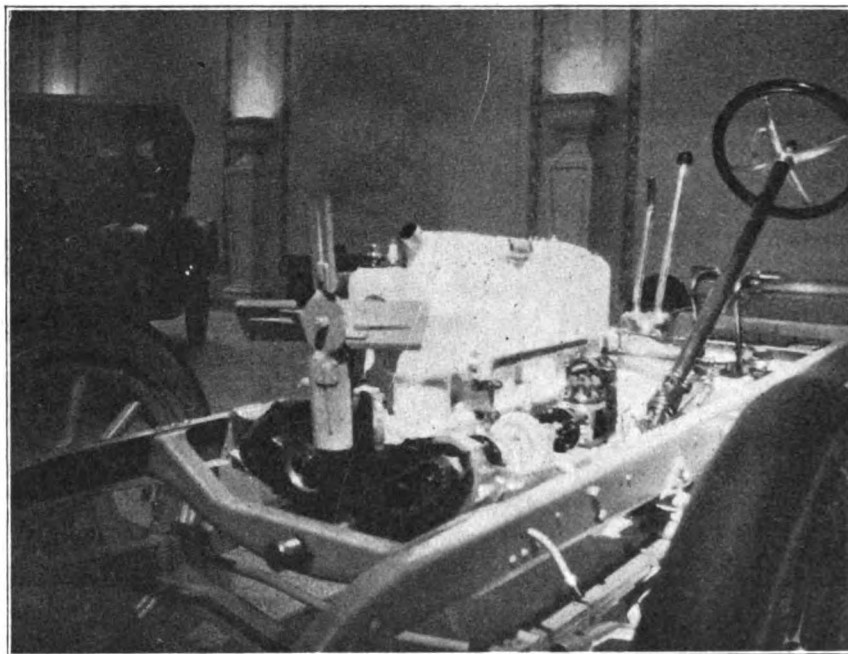
son having a contract all ready, they signed for the car."

At Welbon's, they have come to the conclusion that the automobile salesman is too often a high-grade chauffeur, rather than a high-class salesman.

Welbon believes he needs salesmen in his store; the chauffeurs are for the big service station he maintains in another part of town—so he specializes in picking out salesmen.

These salesmen are carefully schooled in selling methods that start with the first hearing at a prospect's ear. Invariably, just as soon as news is sprung that A or B, or C or D are intending to buy a car, eight different firms will have their respective representatives out after the "lead." These men talk virtues that are Greek to the car-owner-to-be; they give rides which, at bottom, mean all the same thing to him; they pester and annoy,

(Concluded on page 21.)



In a Broad Window at Welbon's a Chassis Was Displayed to Passersby.

time, to a woman who came to the store.

Women, he agrees with all the rest of the force, are by far more difficult to sell than men.

"This woman," another salesman tells it, "had been driving a very cheap car for six years. Johnson had been given a 'tip' that, convinced that it was what she wished, she would buy a higher-priced car. As matter of fact, her husband is a well known business man, one who would probably use the car quite as much as she, once the 'make' was installed at his home, but he had refused us a hearing.

"Johnson sized up the situation and he saw at once that the woman did not like the cheap car. She drove it because she had believed all along that she could not drive more complicated, higher-priced makes.

"He arranged an appointment, called for her at her door, and ushered her to the driver's seat.

"'Why, of course, Mrs. Fabing, you

Some Exempted Classes of Employes

Perhaps, Like Sanderson, You Have Been Paying Insurance Premiums on Employes Not Entitled to Compensation in Case of Injury—Under the Law, There Is a Difference in the Coverage of Certain Classes of Employes

By Chesla C. Sherlock

"I have been paying insurance premiums on all of my employes for several years past," said Old Man Sanderson, the other day, "and I never knew until yesterday that only a certain class of my employes was entitled to compensation in case of injury.

"It certainly pays the employer to know something about the law, or these insurance fellows are apt to take advantage of him! Why, I thought that we had had sufficient experience here in the shop with that compensation law to know it pretty well. I never dreamed that we were paying out money on premiums to insure folks who couldn't get the compensation under the law."

The situation Sanderson found himself in is one that many employers have experienced in the past few years. And the things they say and the feeling they have when they discover that certain classes of their employes are not covered under the terms and provisions of the workmen's compensation acts, are not at all peculiar.

Take a bookkeeper, for instance; he walks out into the shop one day and, seeing some of the men having a hard job lifting an engine off the chassis, lends a hand. The machine slips, and he sustains a hernia and is incapacitated for several weeks from working. He cannot recover compensation. On the other hand, a shopman who goes into the office where parts are kept, stubs his toe on the floor, falls down and wrenches his back, can recover compensation for the injuries sustained.

Why this difference in the coverage of certain classes of employes?

The only reason for the difference is that the legislative authority has seen fit to exempt certain classes of employes from the benefits of the acts; in other words, to exempt the employer from the liability of their risk of injury because it is no greater by reason of the employment than is the risk of injury of an average citizen in the community. That is to say, the employment does not normally increase their normal risk of injury. The only risk they are under is the risk of the

commonalty, or that to which every man, woman and child in the community is subjected—the employment not adding to it.

Employers are not liable for the payment of compensation to clerks or clerical help, or to those who stand in a representative capacity of the employer. Traveling salesmen in some jurisdictions are not entitled to compensation; in fact, in most jurisdictions. Domestic servants, casual employes, or those who are not engaged in the principal trade or calling of the

Every person, however uncultured, and however busy, has within himself all that is needful and has all the time needful to make his intellectual nature, his character, and practically his body and his life. Every person will have a different task, different problems to solve, and different results to aim at; but the process is practically the same, and the transformation is no more impossible for one than another.—Orison Swett Marden.

employer, are not entitled to compensation in case of injury.

In addition, the acts usually provide that policemen, farm laborers and independent contractors have no right to the compensation benefit in case of injury.

As the compensation acts are being more and more strengthened in their weak points and the theory is being worked out to better advantage, many of the earlier rules are giving way and newer interpretations are coming in. In the early days it was absolutely impossible for a casual workman, for instance, to recover compensation. Now we are gradually changing our acts so that these men may have compensation if injured in a hazardous occupation, whether they have been working at a "regular" job, or only by the piece or isolated job.

Workmen suffering from occupational diseases are also excluded in many jurisdictions, but this rule is being gradually overturned and the day is not far distant when a workman, apparently able-bodied, who is em-

ployed at the regular trade or calling of the employer will be compensated regardless of his pre-existing condition physically. And this is only right.

But in the meantime it is wise for the employer to make a careful examination of the law under which he does business, to discover just what classes of workmen are not entitled to compensation. Let him find out how many of these he has in his employ and then let him not include them in the list of his payroll turned over to the insurance company for the purposes of being covered under his compensation policy.

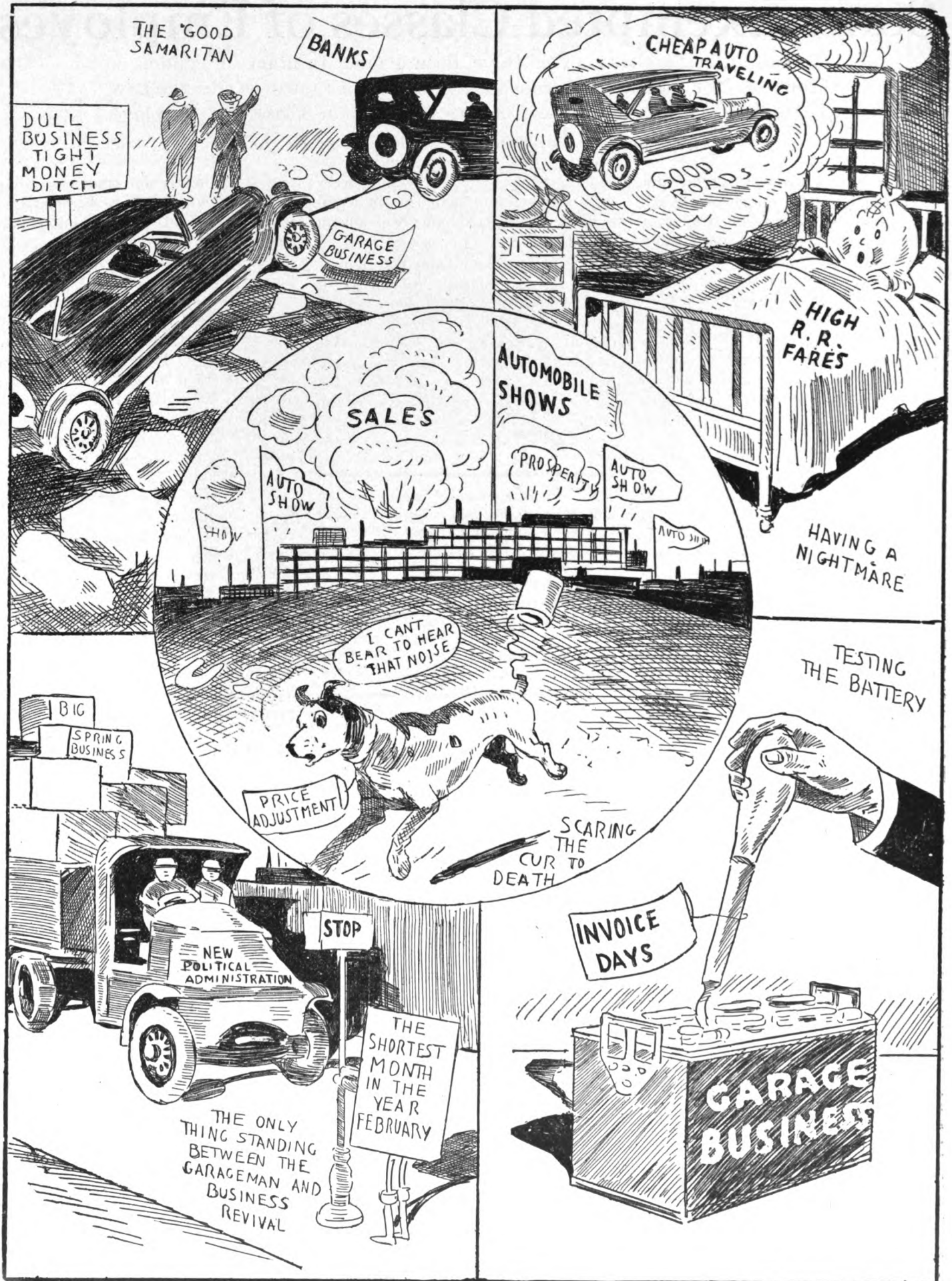
There is no advantage in including them in the list, for they cannot recover the compensation benefit from the insurance company even though the employer does pay a premium on them and thereby seemingly buys that benefit for them.

Thousands of dollars are lost every year by employers who turn their whole payroll over to the insurance agent and allow him to figure their premium payments on the basis of the entire amount, rather than on the basis of only those employes who are covered by the terms of the workmen's compensation law.

One case is recalled where a large employer included everyone on his force. Then, during the year, it happened that three different office employes were incapacitated from work by minor injuries which occurred in the office. When they applied for compensation, they were not only surprised but the employer was deeply resentful against the insurance company for taking his money and then refusing relief to the injured employes.

In justice to the insurance people, it must be said that oftentimes the agents and adjusters do not understand the law in regard to these classes of employes. The writer has heard many of them make the remark that it is better to have the whole force covered and thereby be safe in case of liability, than to fail to include them and get into trouble.

This is a fool's way of doing business!



Say, Are You Member of the I. T. A.'s?

We've Just Had a Meeting of the I. T. A. Club—That's the "Is That Alls," and Them's the Words the Boss Sez You Hadn't Ought to Say—Always Take a Fellow's Munny and Then Sell Him Sumthing Else He Ought to Buy

By Frank Farrington

Dear Pete:

Do you belong to the I. T. A.'s? Weev got a chapter of it here at our garaje the boss says. He got us all in the offis the other nite and sed he wanted to hav a meeting of the I. T. A. Club. Gee, we all wunderd what was cumming and Persy sed he gess it was the International Tire Association and Bob sed it was more likely it was the Independent Tiddlywinkers and I gess it was a new kind of a sooi-side club, the I Take Arsenics. But we was all as rong as a seven dollar bill.

It was the "Is That Alls." You dont get that do you, Pete? Pretty eezy too when you see it. The boss sed heed bin watching us when we sold ennything and all we did when a customer bought sum gas or sumthing was to take his munny and say, "Is that all?"

"Now," he says, "when you buy sumthing in a store and they say 'Is that all?' what do you say? You say yes, dont you?" And noboddy denide it and so did I and the boss went on.

He sed, "That aint sailsmunship. It aint enny kind of a ship a tall. Its just an old hooker all out of date and a ded one. You cant speed up the sails on that kind of a wind. It aint even hot air. 'Is that all?' is the langwidge of the has bin. Its your grandfathers' ideeah of how to finish off a customer and send him home. It sends em all rite only they dont always go home. They may go to a live garaje where they dont think theyve got all a man's munny when heez bought five gallons of gas.

"I kno you boys can sell more stuf here to the same number of customers weer having and I wood like to see

what you can do and the way to begin is insted of saying 'is that all?' to say 'thank you, how about oil?' or 'are your spark-plugs all in good shape,' or 'have you see that new checker tred tire weev got?'"

Well, Pete, we all agreed the boss was rite, all but Persy and he never agreed with ennyboddy about ennything yet. He sed, "Whats he think

all get better pay all rite but Persy and noboddyd care if he starved. I dont see how Dazie gets in on this, but I gess she can smile a few extra iern men out of the boss if she trys hard. Sheez sum smiler.

Bob says Ide ought to get to be a pretty good sailsmun becaws Ime always getting customers to visiting with me even when they might be in a hurry.

If you get a fellow to stop and talk a little, its eezy enuf to bring it around so your talking about sumthing you want to sell.

If a customer aint in a hurry or ennyboddy waiting for me I most always ask him a question or two and that gets him interested. I say, "Well, how's everything up on Umpsted street to-day," if heez from there, and he says "Oh all rite," and then I say "Whooz that man just mooving into that end

house?" and then you see Ive got conversation started and I can swing it around to most ennything. I just ask the feller sum question thats all rite for him, just ennything to start the conversashun and be friendly.

Now Persy he grinds out sum gas or he gets a quart of oil and then walks rite off and hardly waits to get his pay. Of course the customer dont try to start ennything with Persy. Why wood he?

I diddent meen to have you think I vissit with fellers all the time, Pete, and get em to loaf around the place. The boss is sure down on having a lot of loafers around. He dont like em becaws he says they dont spend enny munny and they take up heet and fresh air and ware out chairs and keep the help from thinking about the bizness. But he dont want us to hurry



If You Get a Fellow to Stop and Talk a Little It's Easy to Bring It Around After While About Something You Want to Sell Him.

Ime going to do for what wages he pays me?" And I sed to him, "Mebby if you werent so afrade of ernalng more'n your paid you mite get paid more," but you coodent get Persy to see that heed got to earn more munny before heed get it. He figgers it that the boss has got to raze him before heel try to ern it.

Well, sir, you woodent buleve it but the very next day whoever sold enny gas askt his customer about sum other thing (everyboddy but Persy I mean) and we all kept track and we all sold sum other stuff. I sold a man a five pound box of greese and anuther feller a pump. That shows that sailsmunship counts. Aint it so, Pete?

And the best part of it is that the boss says heez going to pay us more wages as soon as we show him we are sailsmun and not just hired men. Weel

off folks who buy and whooz got munny to buy more.

Well, that's my ideeah too. Ime that way. I aint going to hurry enny-boddy when Ime waiting on em. Of coarse I dont pertend to be a regguler sailsmun like Bob and I aint never sold an automobeel yet, but buleve me I aint going to be nothing but a gas pumper all my life. A feller dont need to be just that eether if heez a good husseler. Ive red about em in the aljer books.

Another thing the boss was talking about was giving fokes their change. He sed "Ive seen you boys hand a woman change when your hands were all black and the woman had on white

gloves and Ive seen you hand a man change when it got his hands greezy and Ive seen you thro the change down on the counter when customers came in here and Ive seen you even lay it on the seet of a car and let a man pick it up for himself.

"Youd ought to see that everyboddy gets his change put rite in his hands and count it out to him as you give it to him and its pretty important too for you to say what it is when he gives you a bill. Dont just take his munny and walk into the offis and say nuthing becaws mebbby he gave you a five and thought it was a ten. Call it off to him when you take it. What can you do to show him after youve put the bill

in cash rejister with other munny?"

The boss dont haf to prove it to me that a man may forget what he gave you by the time youve brought the change back. Ive seen em do it. Persy says the boss wants too darnd much and that heel be expecting you to make a salam when you giv a man his change next. Gee if the boss new the things Persy says when he aint listening heed ti the tinware to Persy before the whissel blows tonite. I dont wish Persy enny bad luck but I hope he choaks. Ide almost make it croaks at that, Pete.

Hoping you are the same, Ime your frend,

BILL

Helpful Hints for Here and There

Sometimes, Oftentimes, Big Things Come in Little Packages—Well, the Following Article Is a Little One When It Comes to Length—But There Are Some Big Ideas in It—And It's the Ideas That Count Nowadays, Anyway

By F. H. Sweet

Sometimes it seems very difficult for salesmen to handle side lines, either of their own company or of some other. There was, for example, a spark-plug manufacturer who added grease cups as a side line and turned it over to his salesmen to sell. They talked the spark-plug first and then brought up the grease cup.

The results were not satisfactory. Coming up after the customer thought the interview was concluded, it did not give a good impression. Some of the salesmen began to forget to talk the side line. A change was made and salesmen were put out handling the grease cup exclusively, and a separate section of the sales department was made entirely responsible for its sale.

An automobile agency had an accessory department, but found it was selling a few tires and was doing nothing remarkable on other items. It occurred to some one to go over the sales records to find out how much in the way of accessories was sold by the salesmen with each new car. The result of the investigation was surprising indeed. Evidently the new owner went off and bought his extra tires, bumper, and other "fixin's" elsewhere.

This point brought out, the reason was quite plain. The salesman's commission was based on the net price of the car alone—and he received nothing extra for the accessories. A 5 per

cent commission was then offered the car salesman, and, in addition, the contract form was modified so that the extra tires and the main accessories were already listed on the form to serve as a further reminder both to salesman and customer.

Thereafter, hardly a car went out of the agency that was not well equipped

This country would not amount to as much as it does if the young men of 50 years ago had been afraid that they might earn more than they were paid. There ought to be some labor leader strong enough and wise enough to make trade unions a means of fitting their members for better jobs and greater responsibilities.—Thomas A. Edison.

with extras. Indeed, it was made a practice to put the extra tires and supplementary equipment on each car placed on display.

The whole problem simmers down to this: All salesmen tend to favor some lines and overlook others. In a line of high-priced articles with one or two supplementary lines, the latter is neglected. It then becomes necessary to find some means of stimulating the interest, or if this is found to be impractical, to make special arrangements for the neglected member's sale.

Cleanliness is the surest protection

against fire. Almost any day we pick up a paper and read that a certain garage was destroyed by fire caused by—spontaneous combustion in oily rags and waste—automobile back-firing set floor on fire—man stepped on match and set oily waste lying on floor on fire—a careless workman, or customer, threw a lighted cigarette end into an open pail full of gasoline.

If cleanliness had been the rule in these garages, there would have been no fire. There would be no film of oil on the shop floor, oily waste would not be left lying about, there would be no open pail full of gasoline; and no workman or customer would be allowed to smoke or throw cigarette ends where there is any combustible element.

Garagemen should insist on a thorough cleaning up periodically, and floors should be scrubbed at least once a week. Metal receptacles should be kept handy where the workmen can deposit all dirty rags and waste used during the day, and each night these receptacles should be emptied and the contents burned, away from the garage, otherwise the garageman is taking a big risk. Not only is he taking a big risk from fire, but his customers are liable to be "shoed" away. No one likes to do business with a concern that tolerates dirt and carelessness.

Accounting:

"The American Garage & Auto Dealer" Is Planning to Again Make This Department a Feature—It's Going to Be a Regular Readers' Questions and Answers Department in Accounting—You Tell Us and We'll Tell You—Let Us Hear from You Pretty Soon

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting

In writing a series of articles on accounting and system, one idea must be kept in mind—"the greatest benefit to the greatest number." The writer will try to make this department one of real service to every subscriber. To accomplish this we must make the department a clearing house for ideas rather than a school for a fixed system of accounting.

We are going to exchange ideas on accounting methods in use among the subscribers of the AMERICAN GARAGE & AUTO DEALER. As we go along we will build up an accounting system that embodies the best ideas of the systems of our subscribers and of other accounting systems in successful operation today in scores of automotive businesses in widely distributed areas. Devised in this way, the system will be flexible and adaptable to each one's individual requirements.

You may have an excellent system, but we may be able to suggest minor changes here and there that will materially increase its efficiency. This department is your department. We do not know it all and welcome any ideas, suggestions and criticisms you may offer. Practical accounting knowledge can be acquired best by the exchanging of ideas of those with experience.

We will pass all the good ideas and suggestions we get on to you. Do your part, don't be selfish; reciprocate. Ask us questions, give us your accounting problems to solve and we will give you the best advice obtainable. Any problems or questions of general interest will be answered in the following issue of the magazine besides being answered direct and with the least delay.

The object of all bookkeeping is to so record business transactions that one's condition can be ascertained at any time with the least labor. Bookkeeping in its simplest definition is the recording of business transactions as they occur and when they occur and the grouping of these transactions to show the effect they have collectively on one's present worth. This information should be available at regular periods and on short notice between

periods. Keep in mind—the simplest system is always the best system.

From your books you should be able to obtain all the information vital to you in the successful operation of your business: Your purchases, your sales, your receipts, expenditures, what you owe, what is owing you, the condition of your bank account.

With a good bookkeeping system, you may determine quickly whether you are making or losing money. You can determine which departments make money and which ones lose, and so direct your efforts that the weak points can be taken care of before showing too serious a loss. To be successful in these times one must know his business and must be able to get his information from his books or records. You can't keep it all in your head.

A good accounting system is no more complicated than the business it accounts for. The garage business is not a complicated one and every garageman should thoroughly understand his accounting system. If he can not do so, there is something the matter with it. The proprietor of a business ought to be able to get vital information about his business at a moment's notice and independently of his bookkeeper. In other words, you should have a system you can operate yourself, if the occasion warrants.

We are planning to make this department a feature of the AMERICAN GARAGE & AUTO DEALER and can do so best with your co-operation. Send us samples of your forms, cash journal, storage tags, sales tickets, invoices, shop cards, etc. Tell us how you do things and we will tell you how we and others do them. We believe in simple methods—the shortest system, the fewest forms are generally the best. You need not fear to consult us. You will get no theory to digest, but plain everyday horse sense.

We will try to avoid the technical and theoretical, and strive to make the lessons a book of reference as practical and simple as possible.

Are bookkeeping records an inevitable necessity, or a necessary evil? If the garage owner can be made to real-

ize that they are indispensable, they can be made a mighty constructive force in his business, and he will assure himself that they are complete enough to afford him the utmost assistance in planning his business policies.

Your books show your progress in business. By comparison, one month with another, one year with another, you can accurately measure your growth. Valuable comparisons may be made with business associates, and tendencies brought to light that may be developed or checked as the situation warrants.

Your bookkeeping records are the source from which your financial standing is ascertained. It behooves every business man to have some system of accounting which will furnish him with information that he can be reasonably sure is accurate. The business man does not need to be an expert accountant to know that records made for him are useful and satisfactory.

From a good set of books you can determine quickly whether you are making a profit or losing money; which departments of your business show the best profits, and so be guided in the direction of your efforts.

Competition is getting keener every day. To be successful, one must know his business. To do so he must be able to get vital information from his books before it becomes stale and useless.

In reality, there is but one kind of bookkeeping. Single entry is little more deserving to be called bookkeeping than is the McCaskey system or any other like so-called short account system. If books of record are an indispensable necessity, they are used to furnish vital information on short notice. Single entry will not do this.

A discussion of loose-leaf versus other systems is not considered of sufficient importance to enlarge on in these lessons. Loose-leaf is the trend of the time. Loose-leaf records possess every advantage that may be offered by any other system, and they have so many individual advantages that the garage owner has no choice left.

In these lessons, both general and cost accounting will receive their due share of attention. General accounting is the science of bookkeeping dealing with the general accounts, assets and liabilities, income and expenses, the recording of facts setting forth present worth and statement of loss and gain.

Cost accounting is the science of bookkeeping dealing with the cost accounts, or the records showing the why of results. In some industries, the cost system is entirely separate from the general accounting system, but in garage work, the two branches of bookkeeping will go hand in hand, as we believe that the average garage owner is more vitally interested in his costs than in any other information his books may furnish him.

Dealers, garagemen, repairmen, we can help you all. When writing for information, give us all the information you can about your business and send us copies of the various forms you use in your bookkeeping system. You can not give us too much information. This is an "Accounting" query and answer column.

Let us see how many questions you can ask us for the next issue.

WINTER'S THE TIME—TO SELL TRACTORS.

(Concluded from page 14.)

these sales arguments in favor of power-farming, when he meets a prospect:

"Help is scarce, isn't it? The only way to overcome the shortage of farm labor, which is real and acute, is to make farm labor more attractive—in other words, to motorize it.

"By motorizing the farm, you lift the heavy labor from the man and the horse"—note the diplomacy—"and put it on the machine, shortening the actual working time for any given job and adding much interest to the work.

"I have seen this sort of thing keep men from quitting a farm many a time and I am confident it will turn the trick again. It's worth trying—isn't it?

"One big advantage in power farming is that it doesn't require as many men for a given amount of work, as horse-farming. With a small tractor, one man or a boy can do as much work in a single day as three men and three teams. This is not exaggeration, but fact—and a very commonly demonstrated fact, at that. When that boy's 10 hours are up, he is through. A tractor doesn't have to be fed, its sore

shoulders washed and treated, and then bedded down for the night.

"You can use your tractor throughout the year, if you get the right sort. It will do your plowing, disking and planting, your haymaking and harvesting, your heavy hauling, your threshing, your road-scraping, your wood-sawing, your churning and assist in your lighting facilities. It will keep going, day and night, if necessary and not too new, through snow and mud, as well as in fair weather. Marshland has no terrors for it, either.

"When the ordinary farm work is slack, the farmer can put it to work on the road, working off his county taxes, or in the woods, hauling logs. You can get a year-around profit from your investment, make more money than ever from the same land and keep your help contented."

IT'S A WAY THEY HAVE AT WELBON'S.

(Concluded from page 18.)

and prove nuisances all around.

Welbon believes that with most men who wish to buy a car, time is money. Money, too, is money, and a prime consideration. So his salesmen go to the prospect ready to talk first on that point.

"Has he another car to 'trade in'?" "Yes." "What sort, what year?"

Just an instant's reference to an official table of all makes by all years. Then that old car is worth today only \$. . . . and they name the figure.

Usually the owner is dumbfounded. Every car-owner overestimates the value of his car. That awakens his interest. He is mentally alert as he can be.

Waive the point a moment. What will it cost to still run the old car this one more year? What will it mean for repairs? New tires, at least, will be needed this season. Those come to so-and-so much. The old car ought to be painted; so-and-so much. How is the engine? How are the brakes? How is the lighting system?

Like a naughty child, shown the real magnitude of his fault, the prospect wilts before you. You are right and he is wrong; of course, that added expense should be counted into the value of the new car.

The actual money price, therefore, of what that new car will have cost by the end of the first year's run is given the man in full—then the terms upon which he may pay. In short, while other dealers' representatives are ex-

patiating on the ability to climb hills in high, the Welbon men are telling the prospective buyer that if he pays, say 50 per cent down, that means only so-and-so much left to pay—and he has such-and-so-much time.

Character analysis from the first moment of sight, is the big essential required of a Welbon salesman. Character analysis, they find, should pay a dealer and his aids in automobile selling everywhere.

Here at Welbon's a comparatively green salesman at this work, emphasizing character analysis in his methods throughout, sold nine cars in eight weeks' time, or better than a car a week. These cars average \$2,000 each, but to be most conservative and eliminate trade-sales and the like, they must total \$1,200 worth of car material sold.

But, behind it all, the big, inviting salesroom is the keynote to the success with Welbon's business. It has made people know the name long before they remotely considered a car. It has advertised the Welbon force as almost nothing else could do.

Not a person visiting town more than three times in all, it is safe to assert, must have passed the establishment and in passing caught a glimpse of its spacious beauty—gray-white walls, the Doric lamps, mosaic flooring, soft rugs here and there, an immaculate whiteness of softly-lighted ceiling, then three cars of a superior make on display, and far to their rear a passage to another room and there as many other cars. Somehow or other, the human eye will stop and take in to the full the beauty that comes its way. The human mind retains this—and visitors have the name of the concern in their memories.

Comes then the day when the news leaks out that these visitors are considering a car. By and by a Welbon man presents his card, pursuant to that lead. Unlike many of the salesmen who come, the prospects do not look on the Welbon representative as an impertinent, unwarranted nuisance. He came from that big, successful concern at 7th street and Walnut. Really, it is a compliment to be waited on by such an organization as that!

Of course, they will be very pleased to hear his terms, ride in his car, hear what he has to say, and inspect still other cars down at the great store.

Once taken there, well, it's not so very hard to sell a man when he's pleased and eager to buy!

The Use of the Lathe for Drilling

When the Drilling of Straight, Smooth Holes is Necessary, the Lathe, Instead of the Drill Press Is, In Most Cases, Best to Use—A Good Mechanic Will Have No Trouble in Turning Out Most Satisfactory Job

By J. N. Bagley

For ordinary drilling with the lathe the ordinary twist drill will be found to be the best to use, owing to the fact that a hole can be drilled straight and smooth and the flutes of the drill afford free egress to the cuttings, making it unnecessary to draw the drill from the work to rid the

In most cases the sleeves or sockets are furnished by the manufacturer ready to receive the drills, but are many times left unfinished at the shank end so that they can be fitted to any particular lathe or drilling machine. However, many lathes are drilled to receive a socket of a certain

number, in which case it can be had from the manufacturer in the finished form, which, of course, is much better.

In times past, drills have been made having three or even four flutes, but the cost of production was increased quite materially and the drill would break so much



Fig. 1—The Shank, A, Is Made Parallel With the Fluted End.

hole of cuttings that have backed up behind the cutting edge.

We might mention, at this time, that in the smaller sizes of twist drills, the shank, A, Fig. 1, is made parallel with the fluted end of the drill while some of the larger drills used for heavy drilling have standard taper shanks as shown at B in Fig. 2. The sizes of the shanks vary as the size of the drill grows larger. Therefore, a small shank will not fit the same socket that the larger ones will fit.

The sleeve or shell socket as shown in Fig. 3 at A is supplied for the purpose of making it possible to use the small shank drill in the large socket by slipping the sleeve over the smaller shank. This socket, as shown, has a projection, B, fitting into a suitable opening in the larger socket, preventing it from turning in the sleeve or socket. The drill end is also supplied with a projection which prevents it from turning in the sleeve. The drill is forced from the socket by inserting the key in slot C, Fig. 3.

Each of the sleeves or sockets takes a certain number of different sizes of drills. However, the shanks of some of the smaller drills are in some special cases longer than the body of the drill. Sleeves or sockets usually have numbers stamped upon them such as 1, 2, 3, 4, 5.



Fig. 2—Some Larger Drills Have Standard Taper Shanks.

Now, going back to the twist drill itself, it has three distinct cutting edges as shown at A, B and C in Fig. 4, and of the cutting edges, C is by far the least effective because it cannot be made as keen as it should be for first clean cutting. This accounts for the unusually fine rate of feed of the twist drill as compared to other smaller cutting tools.

As will be readily seen, the object of

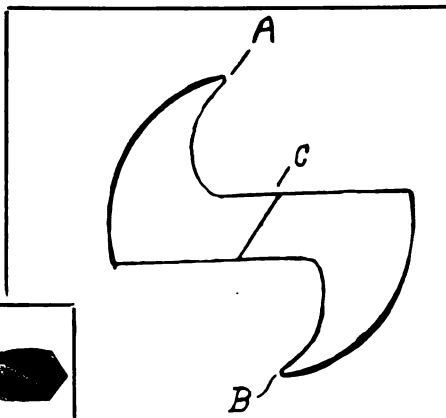


Fig. 4—Twist Drill Has Three Distinct Cutting Edges.

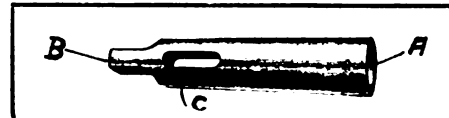


Fig. 3—Sleeve or Shell Socket Makes It Possible to Use Small Shank Drill in Large Socket.

easier that there was nothing to be gained in the several cutting edges.

Then again, if the drill had a number of flutes or cutting edges, it would be much more difficult to grind true, especially by the average repairman who does not usually have special grinding devices for the purpose. The durability of the twist drill is founded on a number of things—the amount of clearance given by grinding to the cutting edge, the angle of one cutting edge to the other and by the degree of twist of the flute. If you will carefully examine the front face, you will find that it varies at every point in the diameter of the drill being greater at the outer corner and least at the center of the drill, regardless of what degree of spirality the flute may have.

To make this more plain, refer to Fig. 6 for example, considering the angle at the corner, A, and at A on the length of the

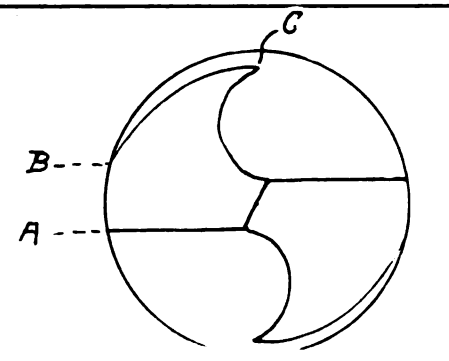


Fig. 5—Shows Circumference Between Flutes.

this clearance is to prevent the drill bearing against the walls of the hole and seizing from heat generated in the operation and destroying the cutting edges, and again, if the clearance was not permitted, it would be impossible to get lubrication to the cutting edges which is not only necessary to prevent the drill over-heating, but lubri-

cutting edge. It will be noticed that the angle or front rake of the corner, A, is obviously that of the outer edge of the spiral, A C, while that of point B is denoted by the dotted line, B A B, which is much more nearly parallel to the axis of the drill. You will also notice that the front rake increases in proportion as the

corner, *A*, is neared and again diminishes as the center of the drill is neared.

Therefore, it will readily be seen that if the angle of the bottom face of the drill as shown at *A*, Fig. 6, be the same from the center to the corner of the drill, the cutting edge must be considered as a wedge

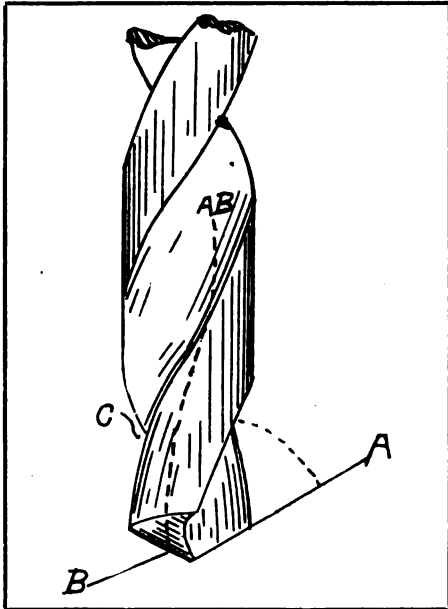


Fig. 6—The Front Face Varies at Every Point in Diameter of Drill.

entirely independent of its angle presentation to the work it is to do. We also find that the varying degree of acuteness is manifest at every single point in its length.

From this, it can be seen that if we give to the end face a certain degree of clearance best suited for the corner, *A*, Fig. 6, it will be the improper one for the cutting edge near the center point of the drill, or if we grind the angle as best suitable for the point it will be the wrong angle for corner *A*.

The path covered by the corner, *A*, being

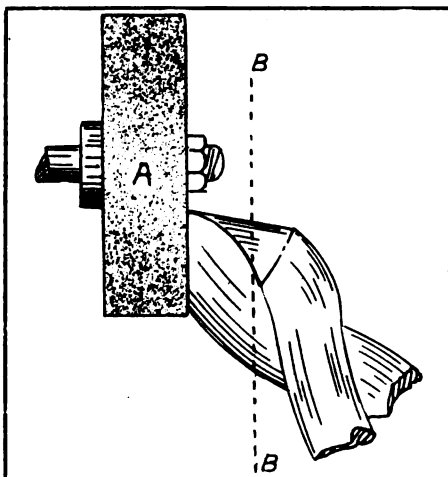


Fig. 7—Method of Grinding Drills in the Ordinary Grinding Machines.

the longest—its cutting duty is by far the greatest and it operates at a much higher rate of speed than the cutting edge nearer the center, hence the getting dull of corner *A*, before the cutting edge nearer the cen-

ter and, because of this fact, the corner grinds against the walls of the hole, causing the drill to heat and finally cease cutting entirely. Therefore, the necessity of lubrication during the process of drilling can be seen.

It is the intention of every manufacturer of drills to arrange the angle of clearance to obtain the greatest endurance at this corner. And in re-grinding, care should be exercised that the degree of clearance is not changed or the drill will not drill as straight and true as when it came from the factory. If the same degree of clearance is given throughout the full length of the cutting edge, it must be made suitable for the point of the drill, and will therefore, be excessive for the corner *A*.

This fault is inseparable from the method of grinding drills in the ordinary grinding machines, which is shown in Fig. 7. The dotted line, in this instance, represents the axis of the motion given to the drill in the process of grinding. You will again notice that the dotted line, *B B*, is parallel to the face of the wheel, *A*. Therefore the angle of clearance must be ground equal throughout the entire length of the cutting edge from center to corner.

In order that this be made more clear, refer to Fig. 8 at *B B*. Suppose the drill to take a full revolution upon the axis, *B B*, in which case it would be ground to the cylinder represented by the dotted lines as shown at *C*. Again we might place the axis on which the drill is moved to grind it at any angle to the face of the wheel as shown at *A*, Fig. 9.

In this case, the angle at *A* may be ground so that the clearance will be the same to the actual surface and it will have the entire length of the cutting surface a keen cutting edge. The clearance may be made to increase as the corner of each face is approached from the cutting edge. In this last mentioned, we have a decided advantage, inasmuch as it affords an opportunity for the lubricant to get to the extreme point of the drill. Again, if we were to prolong the point of the drill sufficiently and give it one complete revolution on the axis, *A*, we should grind it to a cone as shown by the dotted line, *C*, Fig. 9.

A hole may be drilled larger than the drill by grinding the point to one side, that is, by having one of the cutting edges longer than the other, the difference in length of the cutting edges determining the size of the hole drilled. This, however, is not a good plan for close, fine work, although in extreme cases it can be used with very good results.

To grind the drill true, or to have the cutting edges exactly the same length, some sort of a grinding machine should be employed, for the eye will not form a sufficiently accurate guide, if a maximum of duty is to be obtained.

The twist drill should have a certain speed and a certain feed, depending upon the size of the drill if best results are to be had. The cutting speeds and the rates

of feed given in the accompanying table are recommended by a manufacturer of twist drills. If the table is adhered to, little trouble will be experienced along these lines. The table on the opposite page shows the revolution per minute for drills from 1/16 to 1 inch in diameter as these

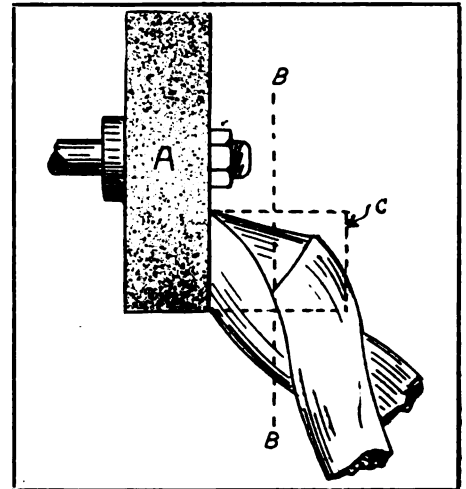


Fig. 8—Angle Clearance Must Be Ground Equal Length of Cutting Edge Center to Corner.

sizes cover about what will be found in the average, well-equipped repairshop.

The rate of feed for twist drills, also given on the next page, will be found very good, providing lubrication is carefully taken care of.

Now, for example, refer to the table, considering the 1-inch drill. The rate of feed for iron is 1/100 inch per revolution of the drill and as the drill has two cutting edges it will, therefore, be obvious that the rate of feed for each of the cutting edges be exactly 1/200 inch to each revolution of the drill. This is only the case when the drill

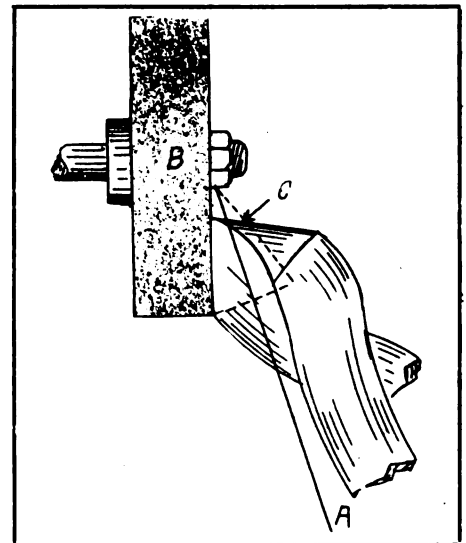


Fig. 9—Axis on Which Drill Is Moved Placed to Grind Any Angle to Face of Wheel.

is ground perfectly as it comes from the manufacturer.

Drills ground by hand may be tested for angle by a protractor. The length of the cutting edges can be determined by resting

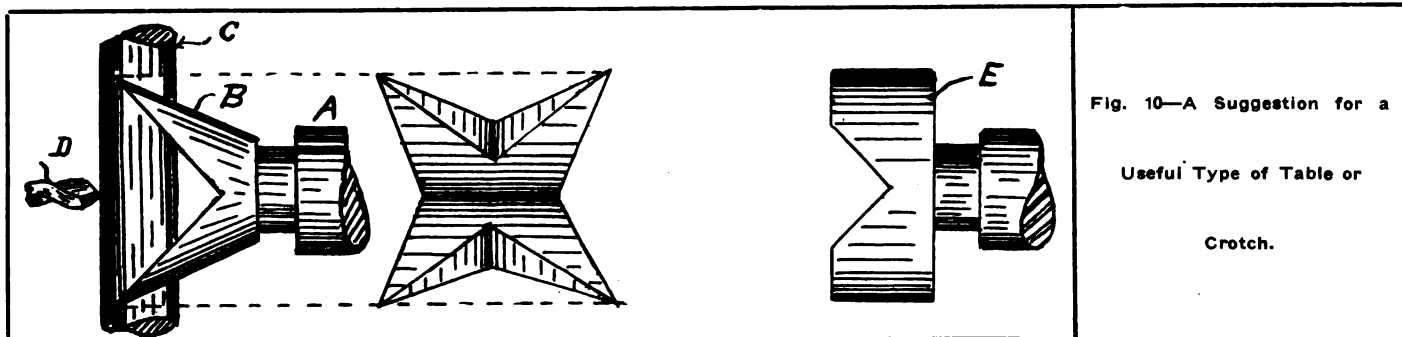


Fig. 10—A Suggestion for a Useful Type of Table or Crotch.

Diameter of drills	Speed for steel	Speed for iron	Speed for brass
1/16	940	1280	1510
1/8	450	650	785
3/16	300	420	550
1/4	225	310	400
5/16	190	250	320
3/8	150	225	250
7/16	130	180	225
1/2	110	150	200
9/16	100	140	185
5/8	95	130	160
3/4	75	105	135
7/8	65	90	120
1	58	80	100

Revolution Per Minute for Drills 1/16-1 In.

them upon a flat surface and using the scale.

A small, drill-grinding machine, or an attachment that can be fitted to an ordinary grinding head, is not expensive and if much drilling is to be done, one should be purchased for the labor saved, in the course of a year or so, will many times pay for it.

If the lathe is to be used for drilling as well as turning—and it should be—a chuck should be fitted to a taper shank that will fit the tail-stock spindle, for many times work can be turned up and drilled before removing from the machine, especially if a chuck be fitted to the tail-stock for holding the drill. The drill can be fed to the work by the hand wheel on the tail-stock while the work is revolved by the head-stock spindle as in ordinary turning.

In case the drill requires steadying, a rest can be inserted in the tool post answering the purpose very nicely. When the drill is held in the chuck of the live center and driven at spindle speed, it will be necessary to have a sort of a table, or crotch, fitted to a taper spindle that can be inserted into the dead center from which to support the work, in which case the work is fed to the drill instead of the drill to the work; the feeding in either case, however, being controlled by the screw device in the dead-center bracket.

There can be had a number of styles and types of these tail-stock tables from the manufacturers and in the general repair-shop there will be need for them. Fig. 10 offers a suggestion for a very useful type of table, or crotch as we sometimes term it. It will be noticed that the crotch, B, extends into the dead center, A. The round shaft, C, to be drilled, fits into the crotch,

preventing it from turning about while drilling. As drill D passes into the shaft, it is but necessary to feed it to the drill with the hand wheel on the end of the dead-center screw. When the shaft is held in a crotch of this type, there will be little chance for it to turn or twist, breaking the drill, as would be the case if it was held against a flat, smooth surface.

There are a great many times when the work to be drilled is the irregular kind, so to speak. This may be handled in a number of different ways—that is, it may be backed up against the table or crotch as already described, or it can be made secured to the face plate of the lathe with some sort of a special bracket and the

classes of drilling as there can be no shifting of the casting as the drilling proceeds. This plan for duplicate drilling, or where a number of parts are to be drilled exactly alike, is the better plan, for a jig or table can be made and bolted to the face-plate and the casting, in turn, bolted to it.

Referring to Fig. 11, we have a simple casting to be drilled as shown at B. In this case, the table or bracket, D, was first made and fitted to the face-plate by means of bolts E. The castings were then held in place by a pair of bolts, E, while the drilling was done. In this manner all castings were drilled exactly alike and interchangeable with one another. After the first hole was drilled, another was to be drilled as shown at A. In this case, the position of the holding jig was changed slightly and the position of the casting changed to allow the drill to enter at the proper point.

There are times when a large enough drill cannot be had, in which case it will be necessary to resort to a boring tool of some kind to finish the work, or to ream it to the desired size after it has been drilled. There are a number of ways of handling this.

A boring bar can be used, such as is on the market with the interchangeable blades or, in case the casting is such that it cannot be handled in the chuck, it can be bolted to the carriage of the lathe and the boring bar, as shown in Fig. 12, used.

Diameter of Drill	Rev. per inch Depth of hole
1/16.....	125.
1/8.....	125.
3/8.....	115 to 150.
1/2.....	120 to 140.
3/4.....	1 inch feed per minute
1.....	1 inch feed per minute
1 1/2.....	1 inch feed per minute

The Rate of Feed for Twist Drills.

drill carried in the tail-stock of the dead center, in which case the work would be driven at spindle speed with the drill remaining stationary.

This plan is to be preferred for some

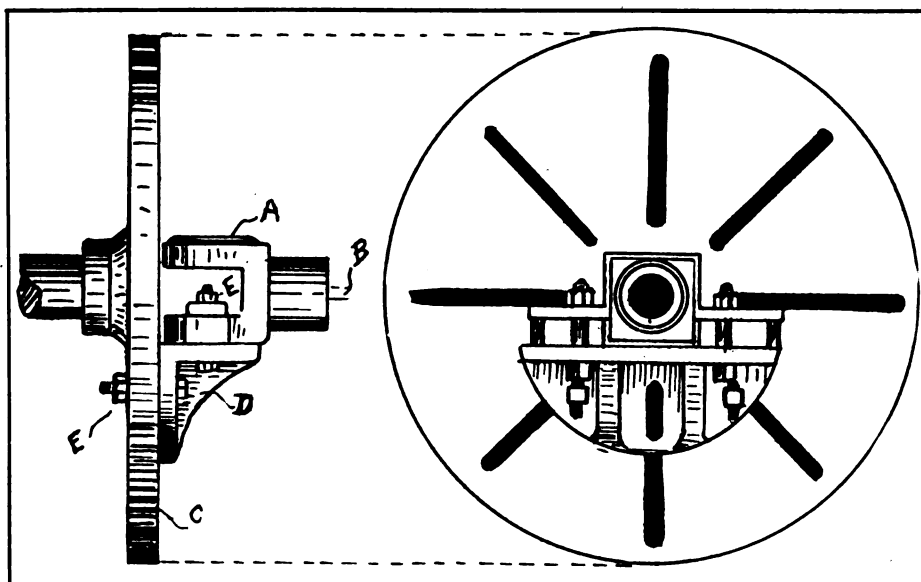


Fig. 11—Simple Casting to Be Drilled Is Shown at B.

In this case, the bar is supported between the centers of the lathe as shown, and the adjustable cutter as shown at *C*, used for the cutting. The cutter can be adjusted after each cut by loosening the screw, *D*. The lathe dog, *F*, can be used to drive the bar which, in turn, slips into one of the slots in the face-plate.

After all is in readiness for the cutting, the change gears may be adjusted so that the carriage to which the work is bolted, will travel at the desired speed and the carriage, *E*, will make the travel, when it can be returned to starting position and the cutting blade re-adjusted for the second cut. This can be continued until the desired hole is obtained, when the work can be removed from the carriage and another placed in position.

There is no limit to the variety of jobs that can be handled on the ordinary lathe after one has become accustomed to handling it. Of course, the operator will have to continually contrive new fastenings and devices for hardly any two jobs, especially in the repairshop, can be handled the same.

These boring bars just mentioned can be had from manufacturers of lathes in various sizes and lengths as the case may demand.

The writer knows of an instance where the owner of a lathe has some 50 or 75 devices for handling special jobs and turns

on the lathe and come out at a punch mark on the opposite side without any trouble whatever.

Motor Truck Production for 1920 Exceeds 1919 by 43,000

Despite depressed business conditions, the motor truck industry in 1920 not only equaled the 1919 production of motor trucks, but exceeded it by 43,000 vehicles, giving a total 1920 production of 348,000 trucks.

National Safety Council Distributing "Safety" Lessons.

The 8,000 industrial organizations, trade associations and governmental agencies comprising the National Safety Council have just undertaken the biggest job ever attempted by the council during the eight years of its existence, to teach the fundamentals of safe-driving and motor-vehicle maintenance to every motor truck and passenger car driver employed in industry, whether or not his employer is a member of the council.

The purpose of the undertaking is first, to reduce as far as possible the number of fatalities resulting from automobile accidents which now approximate 11,000 a year—one person is killed by an automobile every 35 minutes.

Second, to save for industry and the pub-

campaign that while the pedestrian is responsible for a large percentage of accidents, at least an equal percentage of automobile accidents are due to ignorance of the safe methods of motor car driving or maintenance on the part of the drivers of commercial vehicles.

The council with the aid of automobile manufacturers, automobile driving instructors, automobile traffic managers, repairmen, and the representatives of practically every industry interested in any phase of the automobile accident problem, conducted a nine months' study of the causes of accidents and means of eradicating those causes.

This study has just been completed and the findings published by the council in the form of a set of twelve safety bulletins and lessons for automobile drivers.

The lessons, covering every phase of motor vehicle operation and maintenance which enters into the accident problem, will be distributed by the National council through its local councils, through automobile schools, automobile clubs, automobile insurance companies, and through every other means which happen to present itself.

The subjects dealt with include brakes and braking, lubrication and rules of the road, care of steering mechanism, engine, carbureter, ignition, cooling system, clutch, transmission and differential, springs, frame, loading and tires, headlight laws and hazards of blinding headlights, and the like.

The lessons are printed on sheets 8½ inches by 11 inches. On the reverse side of each is a safety bulletin illustrating some specific automobile hazard.

Noted Educator to Direct Work of Highway Transport Board.

One of the best known engineering educators in the United States, C. T. Tilden, professor of engineering mechanics at Yale University, has been named director of the work of the Highway & Highway Transport Education Committee with headquarters at Washington, D. C.

Prof. Tilden will take up his new duties at once and will proceed to formulate and to suggest a comprehensive program for courses in highway and highway transport education.

The Highway & Highway Transport Education Committee is the outgrowth of a conference on these subjects held in Washington last May at the call of the Commissioner of Education. Its work has been defined by the committee as the compilation of all data relating to the economic field of highway transport and the distribution thereof to all interested. As a phase of this, conferences are being held by the committee at different universities.

The next meeting of the committee will take place at the University of Michigan February 23, 1921.

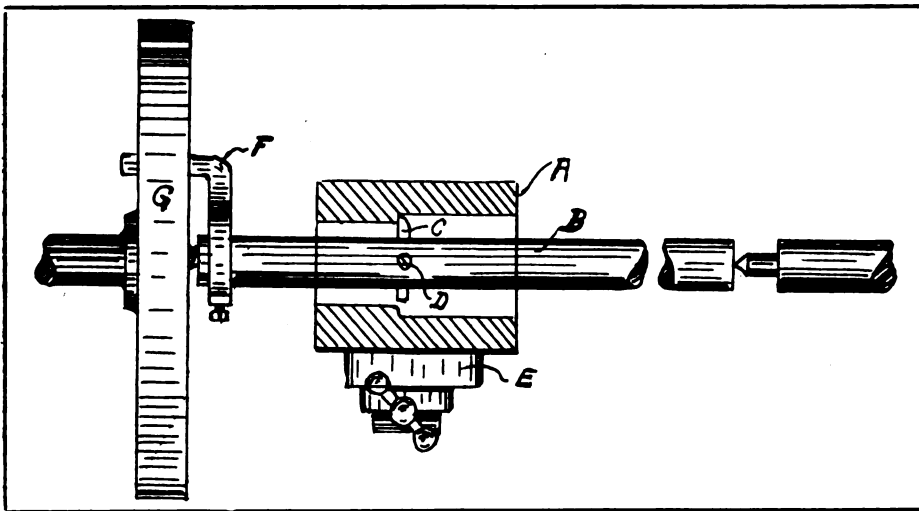


Fig. 12—If Casting Can't Be Handled in Chuck, Bolt to Lathe Carriage and Use Boring Bar.

out some work that to the inexperienced man would seem next to impossible. He purchased many of the first tools from the lathe manufacturer, but as time went on he found where he could make some sort of a device that would simplify matters greatly and did so.

Before starting on a special job, a little time spent in making the necessary arrangements is usually time well spent, but one should never attempt to do a piece of drilling or lathe work until he is absolutely sure that it will turn out exactly as he wishes it. All measurements should be made exact before starting the work. A good mechanic will lay out a job of drilling

lic at large the millions of dollars lost each year through property damage resulting from automobile accidents—this loss amounting to \$500,000 a year in a city of little more than half a million population.

Third, to save for industry some of the many millions of dollars now paid out annually for compensation, medical attention, lost time, and damage for personal injuries resulting from automobile accidents.

The National Safety Council through its 40 local councils has for several years carried on a campaign against jay-walking and other forms of carelessness on the part of pedestrians, but it has discovered in this

Welding, Cutting and Brazing Practice

Building-Up Worn Parts Affords Opportunity to Use the Oxy-Acetylene Torch When the Operator Has No Broken Parts to Mend—The Examples Given Are But Two of the Many the Welder Can Handle Successfully

By David Baxter

Besides the welding together of broken automobile and truck parts the oxy-acetylene torch has several uses, some of which are almost as important. The torch operator, therefore, need not be afraid of being idle just because he happens to have no broken parts to mend.

For instance, the building-up of worn castings, together with the numberless other parts that go to make up the various kinds of automobiles and trucks of today is a fertile field for the torch welder, for there is scarcely any worn part that he can not build up to its original shape, sometimes only to make it last longer, but most of the time to make the parts as good as new.

He will often have to exercise considerable ingenuity although nearly all of this class of welding is in reality only straight work. That is, the regulation and manipulation of the welding flame is the same as when fusing together the broken parts. The chief difference lies in being able to arrange the worn parts and to tell how much of the kind of metal to apply.

There is quite a profitable side-line to this business too. This consists in rebuilding castoff parts to sell in the open market. The welder may make it a point to gather worn parts from the neighboring garages, build them up and sell them. This is just a suggestion to keep the flame busy during the slack spell.

The building-up of worn parts is, in many instances, a re-casting process, for it replaces the worn part with a new one. In the strictest use, it is the building-up of new metal, a layer or more at a time, to make the worn place conform to the original shape and size of the article. This may be done with almost any metal and in some cases different metals are combined. That is, the worn part casting may be built up of a different kind of metal. Ordinarily, however, both the built-up metal and the worn metal should be the same.

Building-up of worn parts differs from ordinary welding in that there is usually no need of preparing the weld such as grooving, cleaning, and filing. Of course, the worn spot should be thoroughly cleaned of all rust, grease, or other substances that might cause slag to form which makes trouble in fusing the metals.

Sometimes this slag is trapped in the weld, leaving spongy spots or holes. And even when burned to a cinder, these things may cause tiny holes in the built-up portion when it is machined, due to gaseous impurities escaping from the burning. So it

is advisable to clean the entire surface of the worn place and an inch or so around it.

This cleaning may be done in several ways, either by filing or grinding, washing with gasoline, or by burning it off with the welding flame. The latter is probably the quickest and most convenient method. The welding flame is passed back and forth over the spot and its immediate surroundings until the grease and dirt are burned to an ash, which is easily scraped off with a wire brush, but the welder should be careful not to overheat the metal.

While some building-up jobs need pre-heating for the same reasons that welding jobs do, the majority require no pre-heating whatsoever, again making the process much simpler than welding. However, it is often advisable to pre-heat in order to save welding gases, the same as we would do in welding two heavy parts together. The pre-heating in this case makes the building-up of the new metal much easier because the pre-heated part holds the heat and prevents the flame heat from being drawn away by conduction. Quite nat-

slow cooling process and allow them to cool without covering or otherwise protecting them from cold air. There is no danger of cracking through unequal contraction.

In the majority of cases, he need not be particular about taking any steps to avoid expansion as he would when welding cast iron or aluminum. If the job doesn't need pre-heating to facilitate the welding process, he may build-up the worn place without thinking about expansion or contraction.

The size and kind of flame to use is practically the same for the building-up process as it is for welding. The weight and thickness of the job govern the choice of torch, and tip to use. That is, the heavier jobs require a larger tip and thereby a larger flame, while the smaller jobs take a smaller flame. As a rule, however, it is well to take a little larger flame than would be used for welding, especially if the worn place covers a considerable area. This is probably more essential on brass work than on other kinds, due to the larger amounts of filler metal added at one time and the fact that the worn surface must be kept molten in larger areas.

The kind of flame means whether it is carbonizing, oxidizing, or neutral. This matter is divided about the same as in welding, but it is no doubt safer to always employ a neutral flame. The different grades of steel and bronze oxidize very easily so there is danger of spoiling the metal if the flame carries more than enough oxygen to keep it burning equally. Steel and bronze have such an affinity for oxygen that if any of it is not consumed in the making of the flame, it will be liable to be absorbed by the molten metal, or the oxygen may be injected into the molten metal by force of the flame. In either event, it will cause the metal to be filled with porous spots.

An expert torch operator sometimes employs a reducing or carbonizing flame when building-up worn steel or bronze automobile parts. As it is a milder one, it is not so hot and does not have the force that a neutral flame possesses. Therefore, the molten metal is more easily controlled. It may be built to shape more easily because it is not blown around by the flame pressure. The use of the reducing flame takes a trifle longer than the neutral flame, but this may be counteracted by using a larger torch. The effect will be the same with less danger of oxidizing the metal. There is great danger of hardening the metal with the carbonizing flame, however.



Fig. 1—Building Up Worn Parts of Universal Joints.

urally then, a pre-heated job can be built-up quicker and easier in many cases.

The built-up job usually needs but little attention in regard to slow cooling, unless it is an iron casting. In this case the torch operator will follow the usual welding procedure. With steel, or wrought iron, automobile or truck parts, he may omit the

The manipulation of the flame is also an important factor in the building-up process, but the operator will find by experience that it is about the same as in welding. The flame is kept almost continually in motion. This is governed by the action of the melting metal, everything else being equal. About the best rule to follow is to watch the melting metal and retard the flame when the metals seem to be "wild." If either seems to be melting too slowly, the flame is advanced a little. The flame is also swung from the filler to the molten bath as conditions warrant. Thus it is played over different portions of the melting as it is needed.

It is not often good practice to point the flame directly into the molten metal, although it is sometimes necessary in order to loosen a bit of slag or oxide. Ordinarily the best results are obtained by holding the flame at a slight angle. This tends to spread the flame and deaden its force. It also serves to protect the molten mass from the oxygen of the atmosphere which is an enemy of all melted metal. Best of all, it serves to prevent an impatient workman from burning the metal in an effort to hasten the process.

Now, in further consideration of torch manipulation, it is safer for the beginner to keep the end of the little white cone of flame about a quarter of an inch away from the melting weld. The flame heat then soaks into the metal instead of being forced, as it were, into it, which is better, since it tends to keep out impurities.

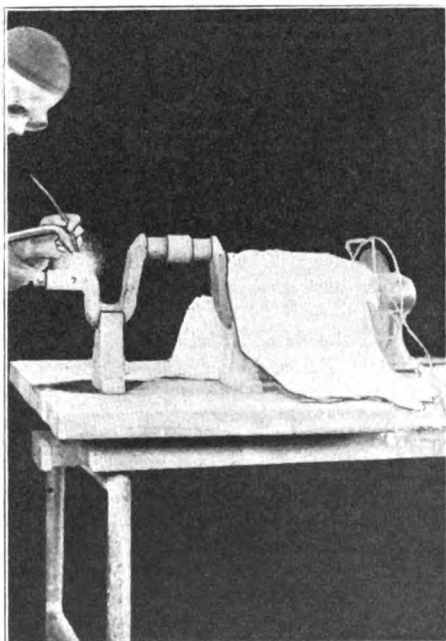


Fig. 2—Melting New Material on a Worn Crankshaft.

A proper selection of the filler or new metal is important in building-up worn parts. The welder should endeavor to use new metal of the same kind as the part being worked up whenever possible. Due to the fact that it cannot always be possible to know the exact nature of the metal

in the worn part, the welder must exercise some individual judgment. Or he should have on hand a tabulated supply of different kinds of filler rods guaranteed by the manufacturer for certain classes of work.

The larger companies will gladly furnish tables for handy reference in selecting filler for special purposes. The size of the filler rod is selected according to the thickness of the job. A rod too large will supply more filler than can be assimilated by the molten surface of the worn spot, while a rod too small will endanger both the surface and the rod to burning.

The large supply of metal by a larger size rod tends to cause a poorly connected weld by overflowing portions of the surface not entirely melted. The smaller rod requires the flame to be played over too much of the surface because it will fill only a small portion at a time.

The way the filler rod is handled also has a lot to do with the success of the filling process. Ordinarily it should be fed into the molten metal direct, shifting here and there gradually as needed, and should not be added until the surface of the worn part is fused, ready to receive it. At times it is essential to twist and saw the filler rod in the molten bath in order to mix the two metals into one mass. At other times the rod is used to break up the oxide or slag, and at times it is employed to scrape recalcitrant bits of impurities out of the weld.

In the welding of broken automobile parts, the use of flux is considered an essential factor. In fact, it is almost indispensable in many classes of work. Therefore, it stands to reason that it should be just as important, if not more so, in building-up worn parts. A flux that does what it is supposed to do is no doubt of more benefit on building-up worn parts, than on welding jobs since the built-up part must nearly always be clean and machinable—that is, the added metal must be free from hard or dirty spots so it can be machined smooth and level. But in welding broken parts, a few pinholes, or hard spots, will often do no harm. At least, this occurs more often in break welds than built-up jobs.

So the operator should endeavor to procure good fluxes made especially for the different metals and should use them about as he would for welding, according to the qualifications given if not on all jobs. This is the safer way. Steel jobs alone do not require flux. All other metals are benefited by a liberal application of flux. This may seem strange in view of the fact that steel oxidizes so easily.

The flux may be applied in one of several ways, but the commonest and probably the simplest method is by dipping the heated end of a filler rod in the flux powder at regular intervals during the melting. Enough powder adheres to the rod to flux that part of the weld where it is quickly deposited. This method guards against using too much of certain kinds of flux,

and against being wasteful with the powder.

Having covered the fundamentals of the building-up process, let us take a few specific instances and see just how the details of the work are accomplished. To do this let us employ automobile parts that are liable to come to any garage welder for repairs, such as the devices shown in Fig. 1. This illustration shows a welder working

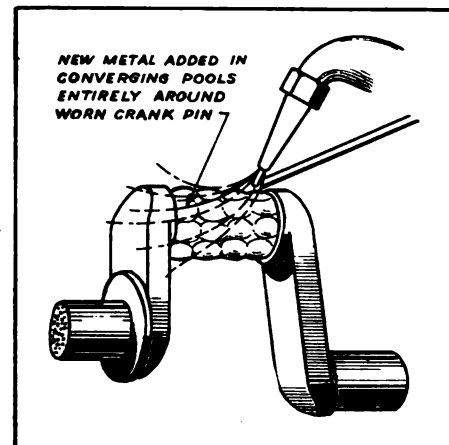


Fig. 3—Method of Applying Filler Metal to Worn Crankpin.

on the fork half of a universal joint. The pins had become so worn that there was considerable side play which lowered the efficiency of the device.

The building-up of this worn part was extremely simple since there was no pre-heating, re-heating, or slow cooling, to be done. The fork was merely wiped clean and placed upon the leveling table with one shoulder in a slot to prevent it from rolling about while the new metal was being applied. A layer of new mild steel was added to the horizontal side, then the fork was placed on end and a layer added to the upward sides.

When this operation was completed, the fork was again placed on its side in the slot to enable the operator to build up the opposite side of the pins. By shifting the position this way, a layer of metal was added entirely around the worn pins.

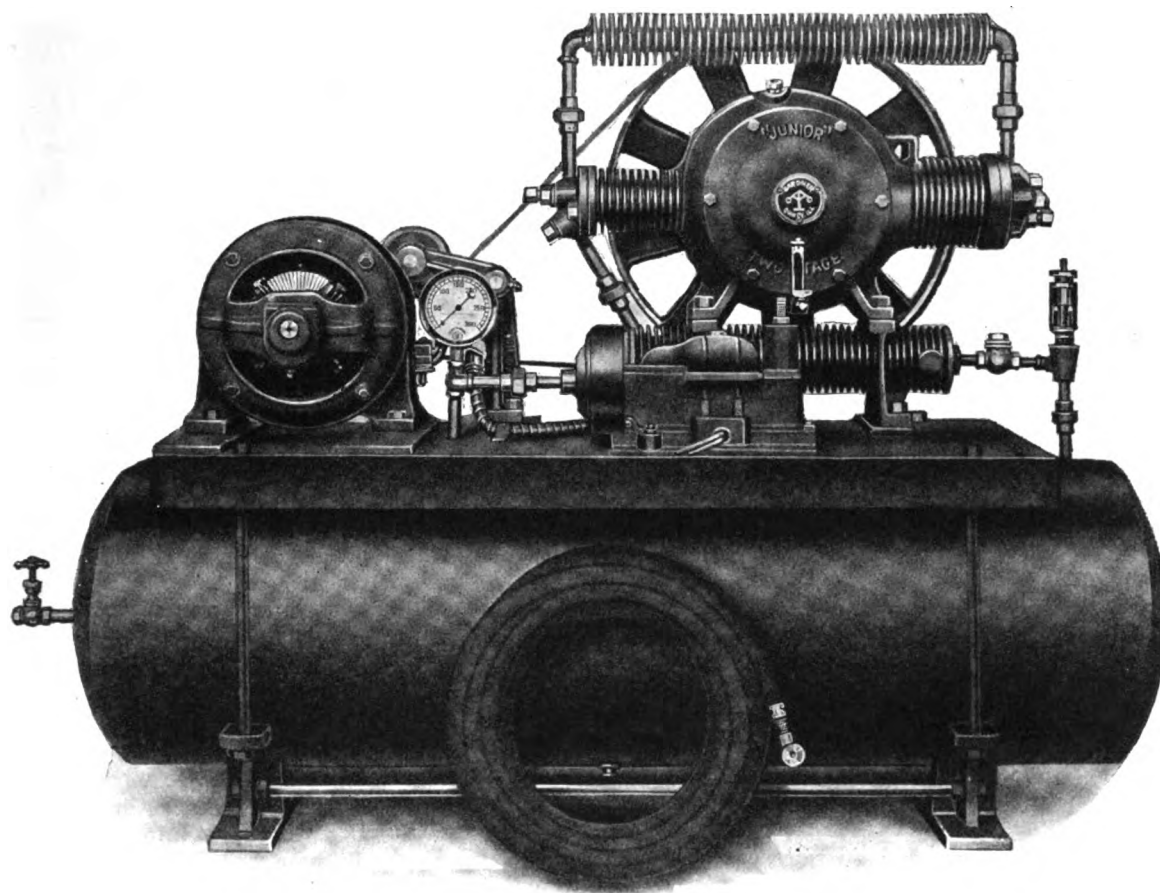
A quarter-inch mild steel rod was employed as a filler, applied by first melting a spot on the pin next the shoulder and then melting a drop of filler onto it. Care was taken that both metals fused together. The flame, being in constant motion during the operation, was swung back and forth across the melting spot. As soon as the drop of filler was deposited and melted smooth, the flame was gradually moved to another portion of the pin toward the end of it, where another drop of filler was placed and melted smooth.

Thus the entire worn surface of the pin was coated with enough new metal to bring it to its original size. Each drop was carefully flowed into the preceding or adjoining deposits to make the total application one homogeneous mass soaked into the pin metal.

Other parts of the different styles of uni-
(Concluded on page 46.)

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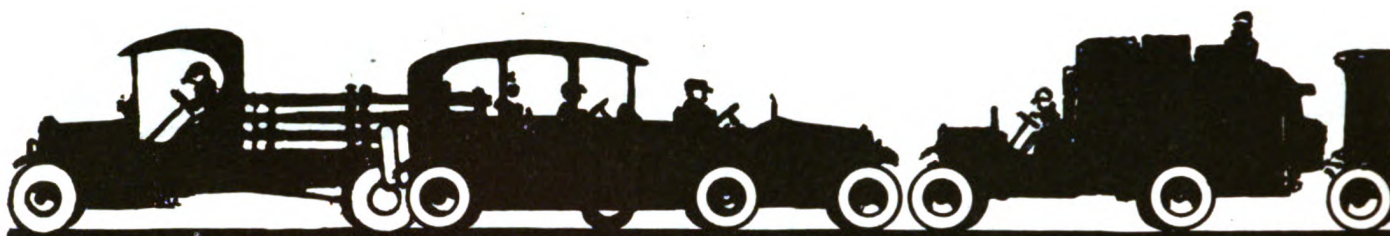
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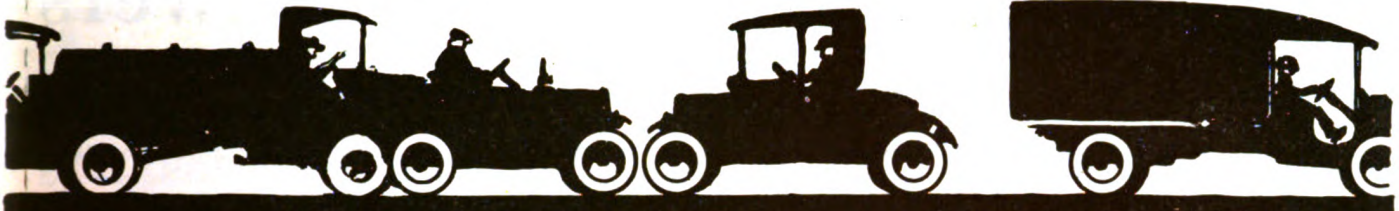
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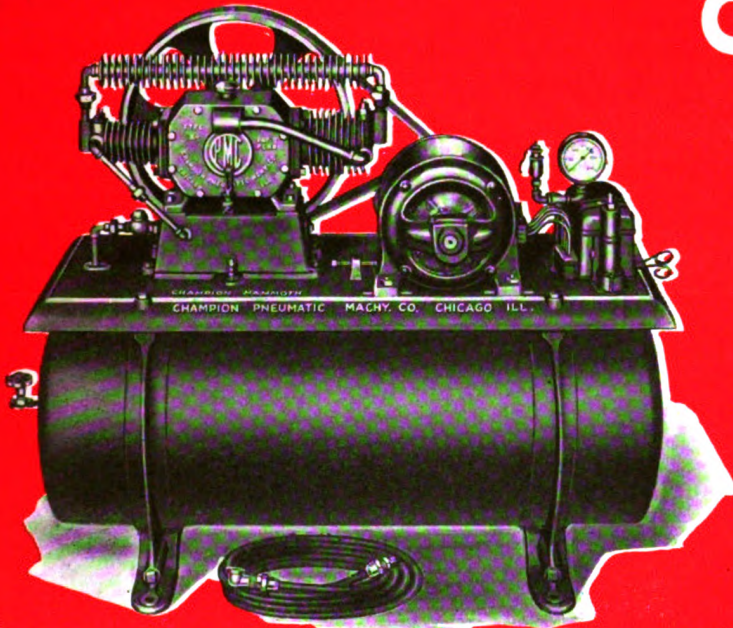
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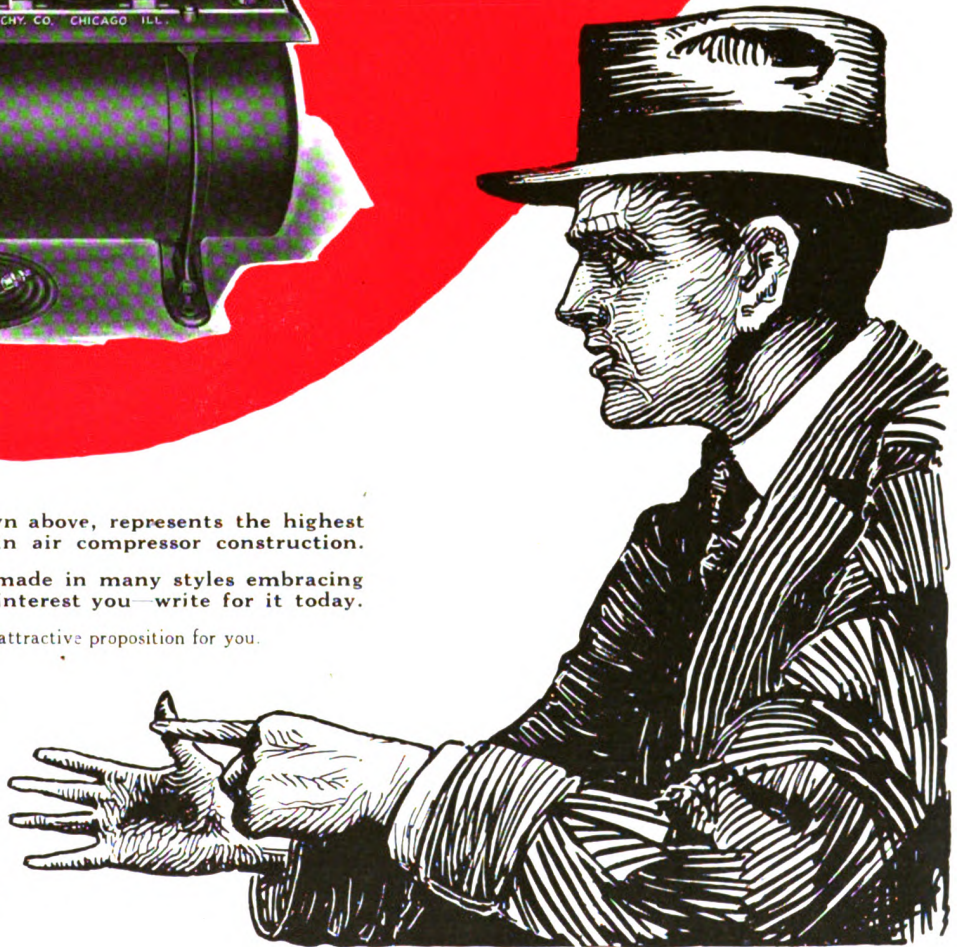
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Readers' Questions and Answers

Battery Troubles.

I would like very much if you would put me right on a few storage batteries I have come in contact with the past week or two.

One is a 6-volt Columbia, one a 6-volt Willard, one a 12-volt Willard. They are apparently well charged when the car is put up for the night—they will spin the motor and light the lamps brightly and apparently are all in good shape. In the morning, when I go to start the motor, however, the battery is dead.

There are no shorts in the wiring, as I have tested it all out thoroughly on all three cars and can't find a thing wrong with it. If you can tell me why the batteries do that, I will appreciate it very much.

Also what proportion of water and of acid should be used to make the best electrolyte.—M. S. G., Fla.

From your description of the trouble with the batteries mentioned, we would suggest that a severe state of disintegration exists in the plates.

This is the result of several causes, some of which are: Expansion and contraction of the active material during normal working conditions, buckling of the plates, excessive charging and discharge rate, and too strong electrolyte. All hasten this condition.

Two and one-half measures of water and one measure of acid should make a very good electrolyte. Pour the acid into the water. Let cool before using.

* * *

Motor Ignition Trouble.

Can you tell me the best way to go about locating electrical troubles.—K. V., N. Y.

Begin at one end of the ignition system and make a series of tests in regular order. Begin first with the spark-plugs under suspicion.

Moisture on the exposed part of the porcelain will often cause the engine to misfire, but this trouble on a wet day may be obviated by greasing the porcelain with vaseline. Other frequent causes of spark-plug trouble may be traced to oil or particles of carbon collecting between the points and sooting of the porcelain, points out of adjustment or burned away.

Ordinarily the spark-plug gap should be adjusted to about the thickness of an old worn dime, depending upon the ignition system, carbureter adjustment and design of the engine.

After eliminating the spark-plugs, examine all wiring and terminal connections, making sure that all wires are tight and that the insulation is not worn off at any place, thus causing short circuits. Next, open the distributor case and see if there is any dirt or carbon dust. If the trouble is there it can be eliminated by wiping with

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

a clean rag. But if it is as yet undiscovered, perhaps the misfiring is caused by the contact points being pitted. These should be cleaned and adjusted very accurately according to instructions of the manufacturer. Also make sure that the tappet spring has not weakened or been broken. This spring is under a constant strain and will bear watching.

Moisture or grease on the surface of the distributor housing will sometimes cause serious misfire, because the high tension current skips across the surface of this foreign matter instead of going through its regular channels.

The remedy is to wipe off the surface. The presence of moisture may be explained by the fact that it is drawn in with the air through the radiator or may condense on the surface on a damp day. The grease often collects from the oil spray thrown out by the engine.

The ignition system is a delicate assemblage and must be constantly watched. Setting of spark-plug points is often overlooked, with the result that other parts of the electrical system are blamed when they are not at fault. Do not guess at the space, use a gage.

* * *

Overflowing Carbureter.

What causes a carbureter to leak and how can this be remedied? After a certain car has stood in the garage over night, the carbureter becomes wet with gasoline, but when the car is in use, the carbureter becomes dry.—J. V., Mo.

This is usually because the float valve which lets gasoline into the carbureter bowl does not seat properly. A little dirt may

have collected between the valve and its seat. Cleaning the parts may remove it.

The valve may have worn. Sometimes grinding the valve and seat together will stop the leak.

It is often advisable to put in a new valve and seat, or an entire float mechanism. In your case the leak is so slight that, while it raises the level enough to cause a slight overflow when allowed to continue uninterrupted for a long time, it is not sufficient to allow the bowl to overflow when gasoline is being used.

* * *

Necessary Lubrication for Ford.

I have recently purchased a second-hand Ford car and know very little about the lubrication demands. Will you please furnish me with some information on the frequency and places for oiling a 1916 model?—H. S., Ind.

The following tabulation gives an inclusive account of the necessary lubrication of your Ford:

Every day: Put oil through engine filler until it rises above the lower pet-cock.

Every 50 miles: Look for oil, water and fuel leaks.

Every 200 miles: Oil the front spring shackles; oil steering spindle bolts; oil ball and socket joints on steering rods; oil rear wheel hub brake cams; oil rear spring shackles; put vaseline in the commutator; turn grease cup on fan hub; turn grease cups on rear axle.

Every 400 miles: Oil brake rod brackets and support; oil hood lacing; oil the starting crank; oil the door hinges and locks; turn grease cup at bottom of steering column; turn grease cup on universal joint; turn grease cup at forward end of drive shaft; put grease or vaseline in front wheel bearings.

Every 5,000 miles: Put grease in gear case under steering wheel; lubricate spring leaves.

* * *

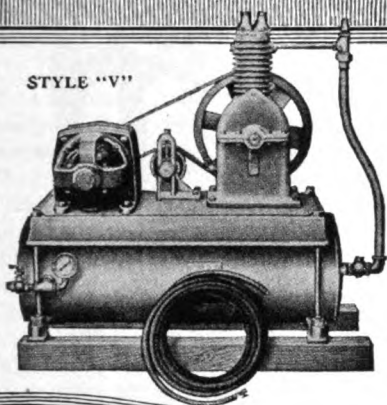
Causes of Spark-Plugs Fouling.

Can you tell me why spark-plugs foul? Any information you can give me on this subject will be greatly appreciated.—K. W.

There are six principal causes preventing the correct firing of the spark-plug:

1. A weak spark.
2. Faulty setting of plug points.
3. Presence of lubricating oil on the plug, due to leaky piston rings or valves, excess oil in the crankcase, or thin oil caused by an overheated motor.
4. Faulty adjustment of the gasoline mixture.
5. Presence of water inside or outside of a plug causing a short-circuit in the plug.
6. Improper location of the spark-plug in the cylinder.

STYLE "V"



THIS SIGN

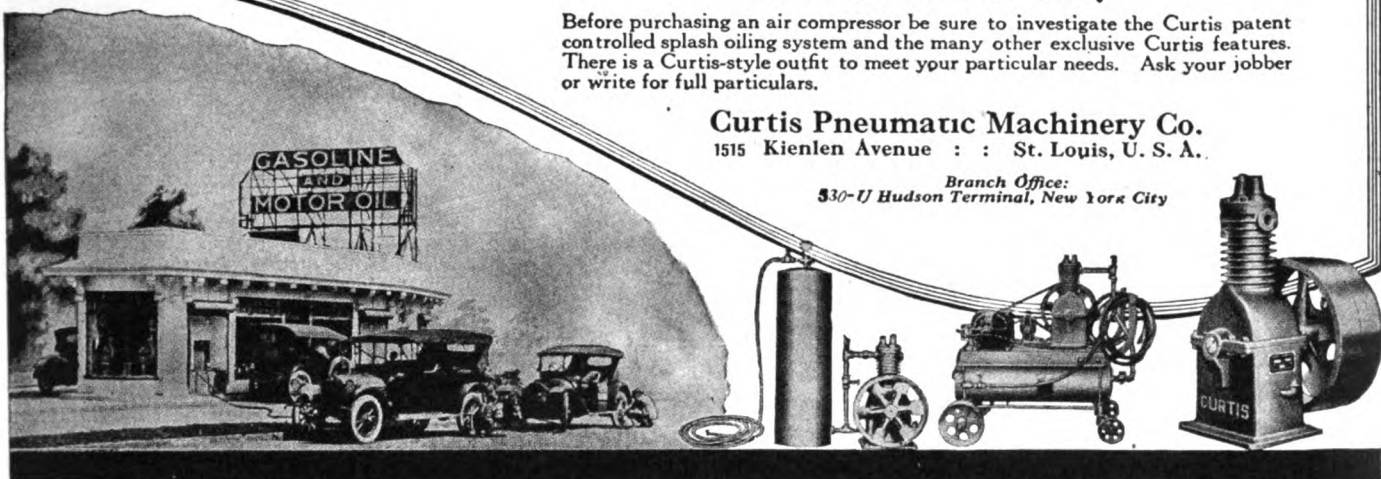
Displayed by progressive garages and service stations will bring you new customers and hold old ones. It stands for pure, clean air, free from oil. Motorists know that oil-soaked air ruins tires, and are on the lookout for this sign. When you furnish Curtis Air you give real service.

CURTIS AIR FREE FROM OIL

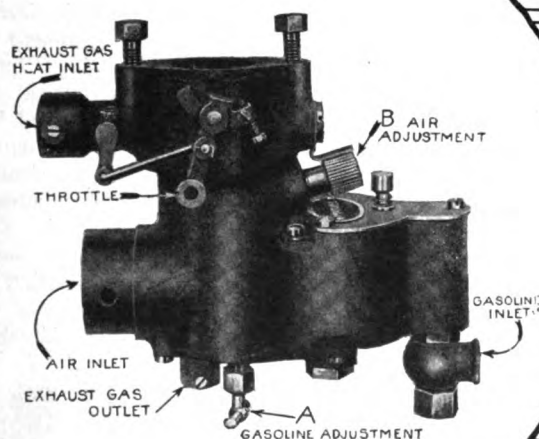
Before purchasing an air compressor be sure to investigate the Curtis patent controlled splash oiling system and the many other exclusive Curtis features. There is a Curtis-style outfit to meet your particular needs. Ask your jobber or write for full particulars.

Curtis Pneumatic Machinery Co.
1515 Kienlen Avenue : : St. Louis, U. S. A.

Branch Office:
530-U Hudson Terminal, New York City



POWERFUL - SIMPLE - ECONOMICAL



The Carbureter that gives Universal Satisfaction

Marvel Carbureters have won an enviable reputation for reliability, economy, and adaptability to all conditions of fuel and weather. Actual tests show that they afford more power and greater mileage with less fuel consumption.

Model "E", illustrated herewith, is standard on Buick, Oakland, Nash, Scripps-Booth—also on G. M. C., Wilson, and U. S. A. $\frac{3}{4}$ to 1 ton government trucks.

Model "N" (for Fords) increases gasoline mileage 18 to 25 per cent and greatly improves car performance.

All Marvel Carbureters are sold on 30-days' trial, with money-back guarantee.

DEALERS—Our trade proposition will interest you. Write for it today.

Marvel Carbureter Co.
Flint, Michigan

MARVEL CARBURETER

Asked by a Dealer.

1. What is the average total overhead of garages in towns of 5,000 and less (based on total sales)?
 2. What is the average office overhead (of total sales)?
 3. What percentage of car sales should free service amount to?
 4. How many times a year should a general accessory stock be turned?
 5. What percentage of total gallons gasoline is lost by evaporation?
 6. What is the average overhead for accessory stores in towns of less than 5,000?
- G. F. C., Mich.

1. 20 per cent.
2. 3 per cent.
3. 3 per cent.
4. Four.
5. 1 to 2 per cent.
6. 15 per cent.

* * *

Books on Welding.

Can you tell me the name of a good handbook on oxy-acetylene welding and brazing?—H. C., Wis.

Good books on "Welding" may be obtained from the Acetylene Journal Publishing Co., Peoples Gas Bldg., Chicago. "Autogenous Welding," by Granjos and Rosenberg, is an English translation of a French book, but is very complete. Its price is \$3. "Automobile Welding," by Keith Dunham, for \$1.25, and "Oxy-Acetylene Welding Practice," for \$1, are also very good books.

* * *

Garnishment.

We have a customer, or did have, that owes quite a bill for accessories and repairs. He is a married man and has one child. He draws a salary of \$175 a month. Can we, by the laws of the State of Nebraska, garnishee a part of his wages each month? Or what would be the best way to collect from him, as he has nothing?—L. & B., Nebr.

The laws of the various states vary as to the garnishment of wages, or rather as to the amount which may be garnisheed. In Illinois, in addition to a certain amount of personal property, \$15 of the weekly wage is exempt from garnishment.

The 1913 laws of Nebraska state that "the wages of all persons, who are heads of families, in the hands of those by whom such persons may be employed, both before and after such wages shall be due, shall be exempt from the operation of attachment execution and garnishee process to the extent of 90 per cent of the amount of such wages."

Unless the party referred to in your letter is paid monthly, you would gain practically nothing by garnisheeing a part of his wages. As the Nebraska laws also exempt personal property to the amount of \$500, it would appear that you would gain but very little in bringing suit against him. The exemptions, however, are void when it can be proved that the person is leaving the state to avoid the payment of debt.

You, of course, could make out a bill, take it to a justice of the peace, stating that you desire to enter suit for it and endeavor to obtain a judgment which would stand as a record against the man. We would recommend that you take the matter up with a local lawyer as there must be undoubtedly some legal steps that may be taken to enforce payment.

Some time ago we heard of a system of collection letters which were said to work out very well in Texas. Whether or not they would produce results in Nebraska is a question. The address from which you can obtain information relative to these letters will be supplied upon request.

* * *

Improving Gasolene.

Do you know of anything that can be put into gasolene to give it more mileage and power? I was told to use one ounce of the following mixture to 8-10 gallons of gasolene: One part each ether, acetone and turpentine. Would you recommend this?—V. T., La.

We do not know of anything that you can use to obtain these results. You might try this mixture out on your car, but the proportion added is so small that we hardly believe that you will know it is there by any effects upon the running of the engine. A proper proportion of ether makes starting easier in very cold weather and may tend to produce a somewhat cleaner combustion.

The use of acetone in a fuel improver is rather new, but it is a common constituent of decarbonizing liquids and may have some effect in keeping down the deposits. We do not know whether it mixes with gasolene or not. Unless it does, you would hardly care to use it.

The object of the turpentine is not apparent as it is very heavy in carbon and not very volatile. If these recommended liquids will mix, we should not hesitate to try the "dope." However, do not expect to find a fuel that is equal to, or superior to, gasolene.

* * *

Carburetor Adjustment.

I am a subscriber and a regular reader of your magazine and would like to have you tell me the proper method of adjusting the Ball & Ball carburetor, such as is used on the Studebaker "Big 6" and Oldsmobile Eight cars.—A. G. L., Cal.

The only adjustment that is possible on the carburetor mentioned is the idling adjustment, which has no effect on the running of the car and is used for idling of the motor only.

By turning the idling adjustment screw up, the mixture becomes lean; turning it down, causes a rich mixture.

Permanent jets are installed at the factory and the adjustment is properly made, with the size jet installed, for other speed.

Keep these permanent jets clean, also the filter screen at the bottom of the float chamber, and you should have no trouble.

Battery Markings.

Please publish the markings used by battery manufacturers to show the age of a battery or when it was made.—C. E. D., N. Y.

Battery markings differ according to the plans of the manufacturers. For instance, some manufacturers mark their batteries in the following fashion:

On the lead name plate on the side of the battery is given the type, production, order number, and order number under which the battery was shipped. On one of the connectors of the battery there is a letter stamped—for instance, A-1.

Twenty-three letters from A to Z (excluding N, sometimes the abbreviation for negative—and X, sometimes indicating positive,) and the symbol & are used to cover a period of two years of manufacture. Then A-1, for example, would stand for January, 1921.

* * *

All About Batteries.

I do storage battery and garage work and I understand all about a battery excepting the active material of the plates.

Please explain to me about the plates. What is the active material of the negative and positive plates made of and how is it made? What kind of chemicals are used and how are they made up? Please explain the different things that are in the plates and how to make them.—C. G., Ky.

We believe that all of your questions are answered in the October and November issues of the American Garage & Auto Dealer.

Information in regard to the composition of the paste of battery plates is not ordinarily given out by manufacturers.

* * *

Decarbonization Methods.

Do you recommend the use of carbon removing liquids? How many miles ought a car to run between decarbonizations?—P. B., Mich.

A good liquid decarbonizer is a safe proposition, if it is not allowed to affect the crankcase oil and if the pistons are oiled before the engine is started. Scraping or burning out is recommended by most repairmen, as it is considered more thorough. If one can use liquid decarbonization, it is so much to his financial advantage.

Speaking generally, under existing fuel conditions, a high compression engine is likely to need decarbonization every 1,000 or 1,500 miles, but engines with lower compression will run considerably longer.

* * *

Tires and Oil.

I would like to know if 30 x 3½-inch tires can be used on the original front wheels of a Ford car? What grade of oil should be used on this car.—W. J. W.

The oversize tire that will fit the front rims is 31 x 3½ inch. The grade of oil recommended by the manufacturer is "light," and it is essential that it should be of such quality as to retain its fluidity in cold weather.

Made Expressly for your work



Butterfield Combination Automobile Screw Plates Meet Every Requirement

The set shown in the illustration was designed particularly for garages and repair shops requiring both U. S. S. and S. A. E. standards, and who wish to avoid the expense of buying a separate outfit of each with the consequent duplication of unnecessary parts. We combine in one set both U. S. Standard and S. A. E. Standard taps and dies.

Butterfield tools are quality products. The long dependable service they render is due to the better materials and workmanship that go into them. Every tool is guaranteed to cut rapidly and to produce absolutely accurate threads.

When you order a Butterfield Set, you get both **quality** and **economy**.

Let us send you Catalog No. 18

BUTTERFIELD & CO. Div.

Union Twist Drill Co.

DERBY LINE

VERMONT

U. S. A.

BUTTERFIELD

Combination Automobile Screw Plates

Accessories—Dealers' Key to Profits

It's Goodbye to Overheating When the Warn-O-Meter Is Used.

For the purpose of eliminating as much as possible engine troubles which result from overheating, the new Stewart Warn-o-meter has been designed.

Fitted to the radiator cap or front fender, the Warn-o-meter is wired back to a thermostatic unit attached to the engine. Concealed in the instrument are two small lamp bulbs. At normal motor temperature, a steady green light shows. Should the cylinders become dangerously hot, due to a broken fan-belt, clogged water pipe, or other trouble, the thermostat automatically switches on a red light to warn the motorist so that he can remedy the defect in time.

The device is said to give true motor conditions regardless of air or water temperature in the radiator, as it is not dependent on these factors, the operating medium being attached directly to the engine block.

One big point of interest is that the device will not allow itself to be overlooked. The brilliant red danger signal cannot fail to get the driver's attention when it suddenly flashes on. It can be easily read both day and night.

On the reverse side of the Warn-o-meter which faces the oncoming motorist, is fitted a transparent design of attractive colors which is illuminated by the light within the instrument. This stand-

ard trademark design may be replaced by the name of the car, the owner's monogram or some particular insignia. This adds an attractive touch to the car, especially at night.

The Warn-o-meter can be easily installed on any car radiator or front fender, or on the hoods of air-cooled cars not equipped with a radiator. Further particulars can be obtained from the Stewart Warner Speedometer Corp., 1826 Diversey Blvd., Chicago. Don't forget to mention the American Garage & Auto Dealer when you are writing for further details.

Al Tells the World of the Value of Nokorode Soldering Salts.

Al Baker slammed down his soldering iron and surveyed his burned arm with a frown.

"Hang it all," he said to Jake, the mechanic at the next bench, "here's another splatter of that darned acid. My arms are beginning to look worse than the hide of a flea-bitten dog."

"What's the matter? Why don't you go slower? Maybe you wouldn't slop so much," said Jake.

"It isn't the slopping," Al replied, picking up his iron and pointing it at his chum. "You can't help splashing a little flux—especially when you're soldering on a job like this one. But how are you going to help yourself when the boss insists on

us using acid for tinning and for a flux?"

"Reckon he don't know anything else to use," said Jake, running his finger along the edge of a file.

"Huh! I've told him often enough. Why doesn't he use Nokorode salts, that's the stuff! They use it up at the Liberty Garage and it's great. They get it in barrels and the foreman up there says four barrels of Nokorode soldering salts will do the work of two carloads of acid.

"I watched one of the men up there working on a job with it. Instead of taking the hot iron from the fire and plunging it into a solution of sal ammoniac and water, he dipped it into a solution made out of one part of those Nokorode salts cut with eight parts of water—and say, it was as bright and well-tinned when he got through as a newly-tinned iron.

"And that fellow said for a flux you can't beat it. He was working on a carbureter job something like this one, and gee, it was easy. The main throttle had worn and leaked gas, while it was closed, and this upset the mixture of the pilot jet.

"He took the carbureter apart, removed the throttle valve, then applied a little of Nokorode flux to the lower part of the throttle case on both sides and then tinned it over with a thin coating of solder.

"After soldering it, he smoothed it up and the throttle fitted. You see, the solder forced the main throttle valve against the upper side of the case where the seat is made, and took up all the wear. When he got through, the seat was absolutely gas tight.

"And let me tell you the Nokorode flux flowed to every part of the joint and the solder went on like velvet.

"There weren't any of those fumes either that make this soldering job so disagreeable. And the fellow said there is absolutely never any corrosion with Nokorode. They use it every time they get a chance and believe me, I wish our boss would wake up and let us use it here!"

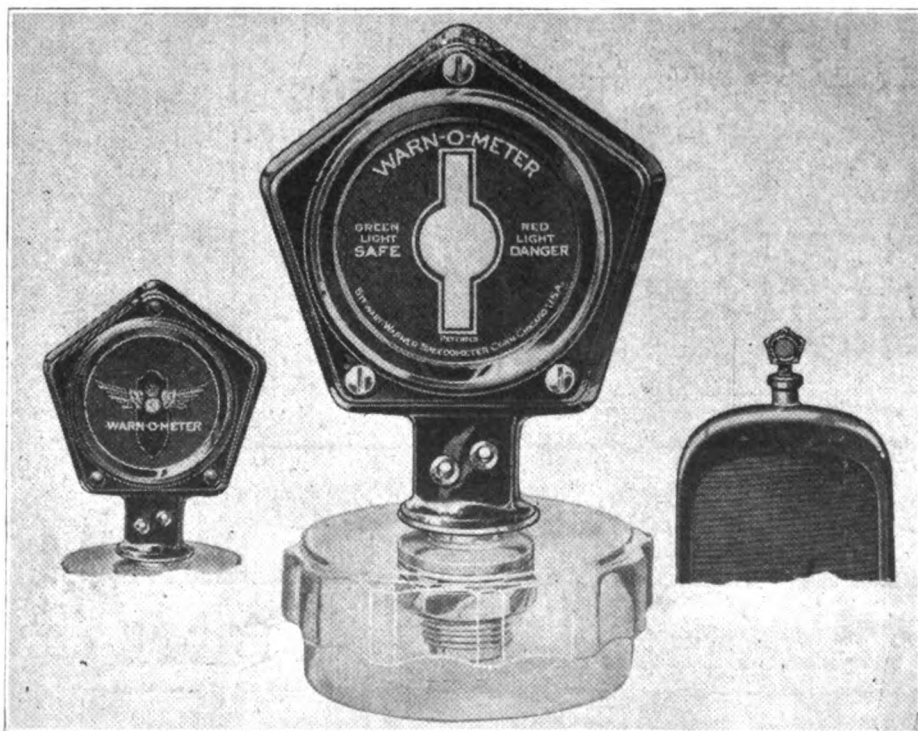
"You tell 'em!" exclaimed Jake enthusiastically. "Say, if you'd go give the boss that Chautauqua lecture, I'll bet—"

But Jake stopped here; a dull red began to burn in Al's face.

A figure had emerged from the shadow of a limousine at the other side of the shop. It was the boss himself—but he grinned.

"I'm sold boys," he said genially. "Where do you get those Nokorode salts? We'll have 'em!"


"At the M. W. Dunton Co.'s place out in Providence, R. I.," said Al, stepping forward. "And say, sir, I'll bet we can get a dozen more jobs a day, if we use Nokorode."



The Warnometer is an Attractive as Well as a Most Valuable Accessory.

Non Freezing





GRINDING COMPOUND

Takes the *Meanness* Out of Valve Grinding

Water-mixed "PEP" has set a new and higher standard of valve grinding which no oil-mixed compound can approach. "PEP" seats a valve in **one operation** because only **one grade** of abrasive is required for cutting and finishing. The job is done in **half the time** ordinarily required—and at a greater profit.

When you use "PEP" the valve face and seat are finished perfectly—this is impossible with an oil-mixed compound. Water, being thinner than oil, distributes the abrasive freely and evenly. When oil is used, the coarser particles of the abrasive, travelling in ruts, leave tell-tale grooves and rings.

"PEP" is clean and convenient to use. Only a water dampened cloth is required to wipe the valves before and after grinding.

"PEP" will not only enable you to produce perfectly ground valves but will substantially **increase your profits** on every job.

When you have once tried "PEP" you will use it exclusively, as thousands of others are doing. You can thoroughly test "PEP" at our expense by sending the coupon to your jobber. Mail it today.

WORCESTER ABRASIVE CO.
1662-1664 Broadway, New York City

Refer to list of jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book".

Non Drying



FREE

**WITH YOUR JOBBER'S O. K.
ON THIS COUPON WE WILL
SEND YOU A HALF-POUND CAN
OF PEP (Value \$1.00 List) FREE**

FREE

Your Jobber wants to sell you the **BEST** Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a half-pound can (value \$1.00 list) under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

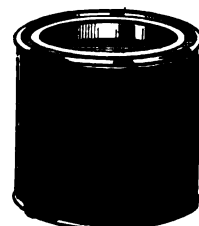
(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a half-pound can of PEP (value \$1.00 list) for testing purposes. I will let you know the results of this test.



JOBBER'S O. K.

Please send the party whose name is written above, a half-pound trial can of "PEP".

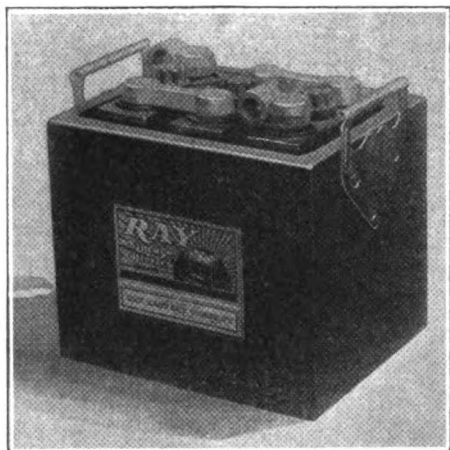


1662-1664 Broadway **WORCESTER ABRASIVE CO.**

New York

Ray Battery Co. All Set for "Three Hundred a Day" Production.

Already new paste mixers, multiple lead moulds and much other speed-up equipment have been installed in the new plant of the Ray Battery Co. in Ypsilanti, Mich., so



In the Ray Batteries are "Lavier Formula" Plates.

that the company will be in a 300 per day production within a very short time.

The battery being produced in the new factory contains, in most highly perfected form, the "Lavier formula" plates. It is claimed by the manufacturer that, by unusual chemical and manufacturing processes, these plates are given a very high porosity, yet unusual toughness. By this formula the makers have endeavored to minimize harmful sulphation, plate breakage and washing down, yet increase the efficiency of the battery by high porosity.

Other than in the plates the construction is conventional. However, the lead plates throughout the battery are large, insuring resistance to vibration. Great care is maintained in the casting of these parts. The same uniformity is carried out in the selection and treatment of the separators. The grids are hand filled with the "Lavier formula" paste, making uniform spread and pressure.

This paste is the creation of Thomas Lavier, vice-president and chief engineer of the Ray Battery Co., long identified with the engineering end of the battery business. The president of the company is Roy R. Fisher, president of the Fisher Tool & Supply Co.

Efficient Lubrication Is Economy—Neglect, Multiplied Expense.

You know, and your customers know, that more cars have been placed on the junk pile on account of improper lubrication than have ever been scrapped through legitimate wear.

Most motorists dislike the task of filling grease cups. The Forc-ful lubricator for Ford cars, manufactured by the I. C. Mfg. Co., and distributed by the Zinke Co., does away with the "dirty work" for it is only necessary to screw the nozzle of this device into the special connections

provided, and by turning down the plunger handle, force grease in and through the bearings under a pressure of 500 pounds to the square inch.

By this means, every bearing of a Ford designed for hard grease lubrication may be thoroughly cleaned and filled with fresh grease in minimum time, says the manufacturer.

The Forc-ful lubricator equipment includes a powerful screw plunger grease gun with automatically-closed nozzle, and fittings for all parts of the Ford car designed for hard grease lubrication, as follows:

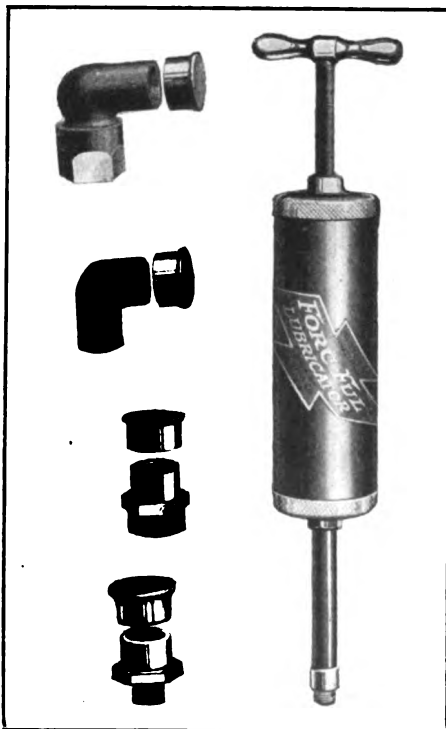
Four straight-line connections for rear transmission bearings, universal joint and two rear wheel bearings;

One special, straight connection for the differential housing;

Two elbow connections, one each for the fan and steering post bearings;

Four special elbow connections for the steering pins, or king bolts, and tie rod bolts.

The Forc-ful lubricator was especially designed for lubricating the wheels of a Ford car. With it the end cap of the lubricator is removed, and the lubricator barrel, filled with grease, is screwed on the hub in place of the cap, after being thoroughly seated on all the threads, the plunger is screwed down and the entire contents of the lubricator may be, if de-



The Forc-ful Lubricator Equipment for Ford Cars.

sired, forced into the hub, pushing the old grease out ahead of it through the opening around the inner wheel bearing.

Descriptive literature concerning this lubricator and prices will be given upon request by The Zinke Co., 1323-1325 Michigan Blvd., Chicago. When writing for further details mention this magazine.

The Marvel "Gives Your Customer a Share of the Profit."

In its new factory, with the most up-to-date equipment, the Marvel Carburetor Co. now has facilities for manufacturing 2,000 carburetors a day. Here is a new laboratory for carburetor research and development work as well as a department to take care of road work which is continually going on with experimental models of various cars.

Marvel carburetors need no introduction to the trade, for they have already attained a wide popularity.

"We attribute a considerable part of our success," states the company, "to the fact that Marvel carburetors employ the fundamental principles to help successful motor building today which is the proper utilization of exhaust heat as an aid to obtain the best motor performance with the present low grades of fuel. For years, the Marvel carburetor has employed the principle of exhaust heat automatically controlled with the throttle."

Model E of the Marvel carburetors is standard equipment on a number of models of the Buick, Oakland, Scripps-Booth, Nash, and others. It is also standard on all General Motor's trucks, Wilson trucks, U. S. Government Signal Corps trucks, U. S. government standard $\frac{3}{4}$ to 1-ton trucks, and others.

Among other unique features, Model E has a heat jacket around the throttle which is connected with a heat jacket around the venturi and low speed gasoline needle. These jackets are kept warm by hot exhaust gases which pass from the exhaust manifold through a tube and enter the jackets of the carburetor under control of a damper which works automatically with the throttle. As the throttle opens, the damper closes, and vice versa.

By this method of applying heat the condensation of gasoline on the inside walls of the mixing chamber is said to be prevented and by having first set the heat damper for more or less heat on low throttle as required, an artificial condition of uniform temperature is maintained which is said to remain constant the year around except during the extreme changes of temperature of the opposite seasons, when it is necessary to make a slight change in position of the heat damper to compensate.

This automatic heat control feature is one of the reasons why the Model E Marvel when used in connection with a Marvel warm air stove for main air intake is claimed to so successfully handle heavy, low-grade gasolines, mixtures of kerosene with gasoline, distillate, and the like.

For further particulars concerning the Marvel carburetor, write to the Marvel Carburetor Co., Flint, Mich. An interesting folder and prices will be sent upon request. And when writing for further details, mention the American Garage & Auto Dealer.



Boy and Slate Signs Are Sales Makers

Wherever dealers have secured the "Boy and Slate" sign service of the National Refining Company they are enthusiastic about it.

They all agree that it is a sales maker.

You can make people stop and read something clever and funny, when they would not stop to read the most beautifully worded piece of serious wisdom ever written.

They all stop to read the "Boy's" funny sayings, and reading leads them to buying.

Makes many friends

When you get the newspapers and people talking about a mere advertising sign, as they are doing everywhere about this sign, you've got an advertising novelty that is a real business getter.

Preachers have built sermons on the "Boy's" sayings and funny men of the stage have stolen these witty lines to make the audiences laugh.

You can't miss it

You can't miss this sign. It stands over six feet tall, cut out so as to look like a real boy, and supported by a framework so that you can set it up on the curb where none can miss it.

It is brilliantly painted. The funny sayings which we provide are enough for a change every other day.

Write for this sign

Write for this sign and for particulars about our scientifically refined EN-AR-CO products, the satisfaction builders. Get our extremely liberal dealer proposition. We make EN-AR-CO motor oils, EN-AR-CO gear grease, White Rose Gasoline and National Light Oil (kerosene), which are the highest type of scientifically refined oil products on the market. WRITE TODAY.

THE NATIONAL REFINING CO.

1053 Rose Building, Cleveland, Ohio

Sayings of the En-ar-co Boy

The most important part of manager is "man."

Many who think they are big guns are fired.

It's the poor nuts that fall for the first frost.

Many who ask for daughter's hand get only papa's foot.

The distance between some men's ears is one block.

Many run fast enough but not soon enough.

Pull the oars and you won't have time to rock the boat.

Chickens come home to roost if the Flivver doesn't break down.

The best-man never gets the bride—at a wedding.

Milk of human kindness beats Cold Cream for wrinkles.

A suicide blonde is one who has dyed by her own hand.

A bill collector meets many men of promise.

THE NATIONAL REFINING COMPANY 1053 Rose Bldg., Cleveland, O.

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City.....State.....

I now sell.....oil

Practical Hints for Shop Mechanics

Renovating Aluminum.

It is difficult to restore aluminum to its original finish, especially to get the frosted appearance back after it has been worn. The only reasonably satisfactory method of treating the aluminum is to dip it in a bath of water slightly acidulated with sulphuric acid, allowing the metal to remain in for some hours. This will cleanse it as well as it can be done.—L. N., Cal.

* * *

Simple Filter to Clean Oil.

As a means of separating dirt, metal dust, etc., from used oil, the filter, which may be made in the following manner, will be found very efficient:

Fasten a piece of muslin or cotton cloth to a metal or wooden ring large enough to fit over the top of a can, drum or other vessel.

The cloth should be left a little slack, and into the shallow bag so formed, a quantity of sawdust is placed.

The oil to be filtered is poured through and leaves its foreign matter behind in the sawdust.—L. M., Mont.

* * *

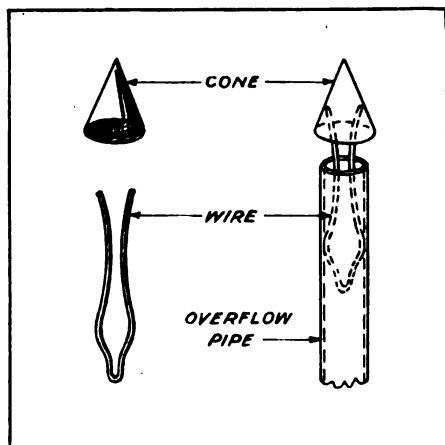
Pulling Gears.

To facilitate pulling gears, wrap them with cotton wicking, soak with gasoline and set on fire. A steady pull and a few blows with the hammer on the screw of the gear puller and anything with two ends will come off.—A. D. S., Ill.

* * *

Stopper for Radiator Overflow Pipe.

Nearly always when filling a radiator, a large part of the water escapes through the



Stopper Prevents Radiator Overflowing.

overflow pipe. Make a cone of lead or tin and solder a wire, shaped like a hairpin, to the underside of the cone.

Allow the wire to extend down into the overflow pipe and the cone will prevent

ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

the water from flowing through the pipe in filling.—T. R., Mo.

* * *

Curing Crack.

The following is a neat way of repairing a crack in the water jacket or any cast-iron part of similar nature:

Dissolve some bluestone, copper sulphate, in water. Clean the edges of the crack with sandpaper or a file. Paint the iron with the copper sulphate solution until a thin layer of copper has been deposited on it. This surface will then take soft solder very nicely.—K. F., Mont.

* * *

Correcting Body Sag.

When the doors on one side of the body do not fit properly, either bind so that they are hard to close or fit too loosely, with so much clearance that the catch will not snap, the trouble may be cured by placing wooden wedges under the body, at the rear. Metal plates may be also used.

In either case, the wedge should be bolted through the frame so that it will remain firmly in place.—L. A., Cal.

* * *

Thawing Filter.

I have had an experience with a gasoline pump which I expect others have had. We neglected to drain our filter. It froze on us and, as a result, we could get no gasoline through the pump. The next thing was to devise a method to thaw out the filter so as not to have the danger of setting anything on fire.

We removed the hand-hole plate at the bottom of the pump casing and placed two fire bricks, which we had previously heated, under the filter tank. In about 15 minutes the tank had thawed out. In heating the bricks, care was taken not to get them red hot as they would ignite gasoline if heated to that condition.—A. V. C., Ill.

Lens Cleaner.

A good compound to use in cleaning reflectors is denatured alcohol and water in equal parts. The solution should be applied with a soft cloth which will not scratch the surface.—H. P., R. I.

* * *

Balky Starter.

When the starting motor stalls easily and fails to spin the crankshaft as it should, it is a safe bet that either the storage battery does not test up to the necessary 1.275 or that the contact points of the line switch are not making proper contact.—F. H., Iowa.

* * *

Protecting Gaskets.

When a gasket has been in place for some time, the material often adheres so firmly to its base that removal is practically impossible without tearing the gasket. The way to obviate this trouble is to give the gasket a generous coating of graphite, which prevents adherence and permits using the part time after time.—A. T., Cal.

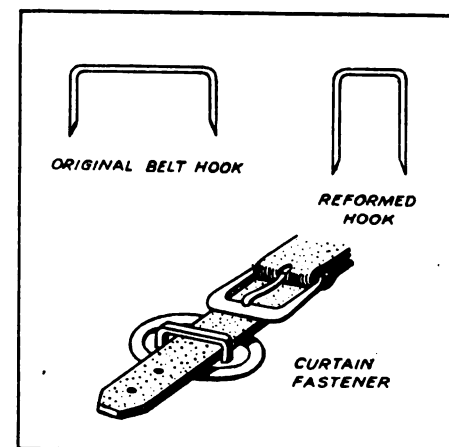
* * *

Repair for Curtain Hooks on Cabs.

The curtain hooks on the cabs of trucks very often become lost or bent. Usually when one has been bent over, it will break when straightened.

We find that an excellent substitute may be made from a good-sized belt hook. One that is about 1/2-inch across the top is about right. Straighten out the hook, and by pressing in the vise it may be made true more easily than by hammering. Then take pliers and bend the legs at right angles to the head.

Leave the head just wide enough to ac-



Belt Hook Is Substitute for Curtain Hook

commodate the strap fastener. Drive the hooks into place. Should they protrude on the inside, they may be clinched. The accompanying illustration makes it plain.—W. T., Mo.

Now Comes the "Jumbo" DeLuxe

In line with its established practice of blazing the trail in the development of new and improved devices, this company has perfected the "Jumbo De Luxe Compressor.

As the word De Luxe indicates, this new equipment is simply an evolution of the long established and remarkably successful De Luxe line, incorporating the same features of compactness, simplicity, quietness and fully automatic operation.

The "Jumbo" embodies a larger

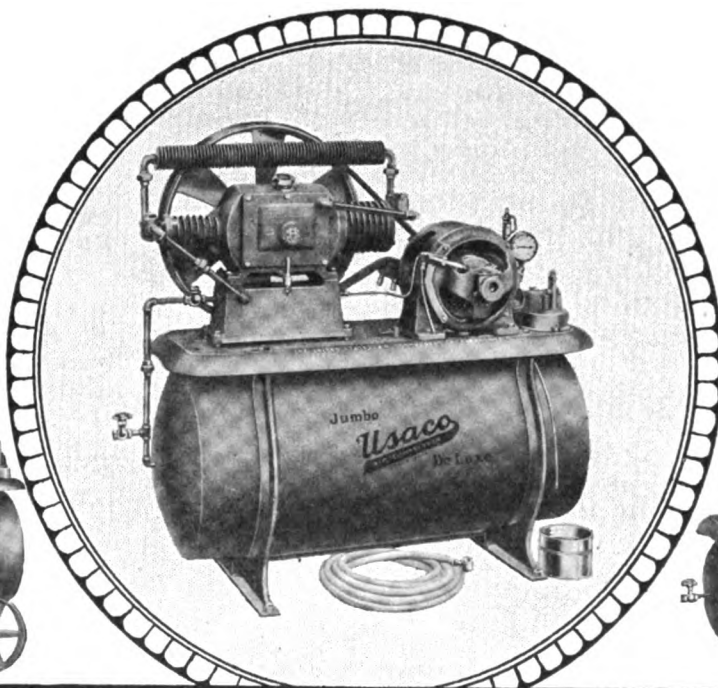
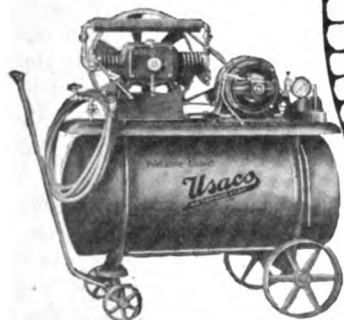
compressor and more powerful motor than the "Giant" De Luxe and therefore has considerably greater capacity. It is capable of inflating tires of all sizes and pressures but is especially adapted for large garages and repair shops where a considerable volume of air is also required for intermittent service in cleaning and general repair shop work.

Write for literature describing the entire Usaco Line, mentioning the name of your jobber.

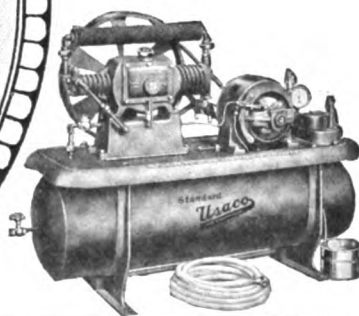
The United States Air Compressor Co.

5308 Howard Ave., Cleveland

The "Giant" DeLuxe, one of four portable compressors affording the possibility of selecting a machine exactly suited to your requirements.



The "Standard" DeLuxe, one of four fully automatic compressors, affording ample range for proper selection of a stationary compressor.



Two Stage **Usaco** Air Compressors

Carbon Remover.

A few teaspoonfuls of denatured alcohol squirted into the cylinders while they are hot, after which the engine is run fast for a couple of minutes, is a good carbon remover.

This simply amounts to substituting denatured alcohol for the kerosene that is commonly used for this purpose.—D. L.

* * *

Squeaking Brakes.

When brakes squeak when applied, it is sometimes due to the brake linings becoming worn so that the heads of the rivets holding the linings to the bands strike the drum. Remove the bands and sink the rivet heads below the lining. If the linings are too thin, renew them.—A. T., Cal.

* * *

Overheating.

An ingenious automatic safeguard against overheating was recently devised. The ground for the ignition current was made by soldering a copper wire to the top of the rear cylinder. Just as soon as heat enough develops in the cylinder, the solder is melted and the engine automatically stops.—P. D., Mich.

* * *

Piston Groove Cleaner.

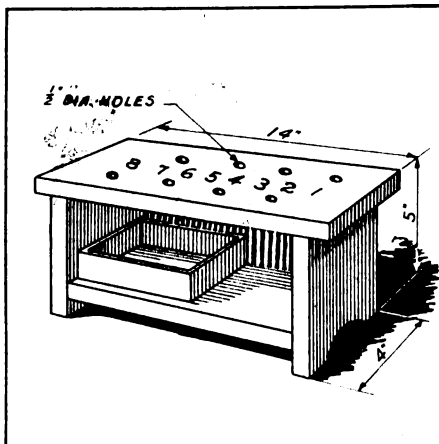
An excellent tool for cleaning carbon out of piston grooves may be made by grinding down a piece of broken piston ring of the proper size so that it has a cutting edge, such as a chisel has. This tool fits exactly in the groove and cleans it perfectly.—L. A., Cal.

* * *

Rack for Engine Valves.

When disassembling a motor, it is desirable to keep the valves from becoming mixed up. Then they may be ground and re-placed in the order in which they were removed.

Get a board 4 ins. wide and 14 ins. long.



Convenient Rack for Engine Valves.

Drill eight holes with a 1/2-inch bit. Make them in two rows as shown in the sketch. Cut two pieces of board five inches long for legs. Nail securely to the under side of top board. Nail a board on the back.

Cut another board for a small shelf and fasten in place just four inches below the top board. A small cigar box may be placed on the shelf and used to hold the valve pins, springs, and washers. Holes in the top board may be numbered as shown in the accompanying illustration.—M. T., Mo.

* * *

Rough Belt Will Slip.

When the leather fan belt develops considerable slippage, it is probably because the rough side of the leather is against the pully surface. The smooth side of the leather has a much greater traction adherence.—D. P., Mich.

* * *

Straightening Wire.

Stray pieces of copper wire have many uses, but it is often necessary to straighten out wire that has already been used before it can be employed again. See that there are no sharp bends or kinks in the wire and straighten out by hand any of these which are found.

Fasten an end of the wire to some firm anchorage, grip it in the vise if necessary. Loop the other end of the wire around a hammer handle or similar instrument and then pull out the length of wire. Repeat this operation as often as necessary. If the wire is of soft copper, it will stretch a little, which improves it.—K. F., Ohio.

* * *

Graphite for Pneumatic Tires.

Flake graphite makes a good tire lubricant, giving an easy fit of the inner tube and reducing heating. It lasts longer than soapstone and has no chemical effect on the rubber, graphite being chemically inert.

Graphite is also useful for treating rims as a rust preventive. The application of a thin coat of quick-drying varnish to which graphite has been added until it is about the thickness of cream, helps protect and conserve the rims effectively.—K. T., Ore.

* * *

Elusive Knock.

Sometimes a knock, difficult to locate, is caused by one of the pistons touching a shoulder in the top of the cylinder because the packing between cylinder and crankcase has been worked thin.

Obviously a thicker packing will cure the trouble.—M. G., Pa.

* * *

Heating Soldering Iron.

A can of the ordinary solidified alcohol will be found useful in heating the soldering iron for small jobs on the radiator, wiring, etc.—B. L., Minn.

* * *

Emergency Rim Expander.

In trucks having the now popular pneumatic tire equipment, the driver can, in the absence of the conventional rim expander, spread a diagonally split rim by means of a jack and two blocks of wood.—L. A., Cal.

A Handy Scraper.

The scraper shown in the accompanying illustration is forged from self-hardening steel. It is made square on one end and flattened to a point on the other end, similar to a cold chisel. The edges are then



For Scraping Rust or Parts to be Soldered.

ground square on a grindstone. I use the tool for scraping rust or parts to be soldered.—P. B., Pa.

* * *

Storage Battery Cable Protectors.

In many makes of cars there is a liability of the cables leading from the storage battery, becoming worn by chafing against some metal parts. This will, of course, cause short-circuits, delays, and trouble with the battery.

Make sure that this will not happen by slipping a section of garden hose over the cable. If impossible to remove the terminal, then slit the hose and place around the cable and wrap with tape. This makes a protector that will last indefinitely.—W. T., Mo.

* * *

Battery Connector.

A very convenient battery connector may be made from a piece of heavy steel coil spring. The spring wire at each end is fashioned into a hook and these are slipped into the battery posts, the tension of the spring insuring perfect contact.—D. N., Mich.

* * *

Protector for Gasolene Line.

Many cars come in for repairs on the gasolene line. Very often there has been a hole rubbed through the tubing by contact with the frame, some bolt, or the exhaust pipe.

Where the tubing has to cross over a rod or frame member, we find that it can be protected by slipping on a section of garden hose or small flexible electrician's loom. And where it has to cross the exhaust pipe, the protector should be wrapped with asbestos.

This will prevent trouble and delay due to a leaky line and may save the machine from catching on fire.—G. L., Mo.

Every Chance for Profit, Not One Chance for Loss

YOU know Harvey Spring quality. You know the broad, liberal and exceptional Harvey guarantee that protects both dealer and customer.

Another link in the chain of success built for every dealer who sells Harvey Replacement Springs is the Harvey Selling Plan.

The Harvey Sales Plan

Its purpose first, last and always is to protect you, the dealer. It offers every chance for profit and eliminates every possibility for loss.

It assures protection against dead stock and burdensome investment. It materially increases the opportunity for quick turnover and bigger sales.

It is constructive, not restrictive—sound, sensible and equitable. It insures profit on replacement springs.

Send for full details of the Harvey Selling Plan together with the Harvey Book—a complete guide for ordering any of the 1500 different Harvey Springs—a guide to better spring business.

Harvey Spring & Forging Company

1041 17th Street

Racine Wisconsin



WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 30.)

versals are built up in much the same way. The new metal is added in tiny converging pools that pile up a little more than necessary in order to form stock for machining purposes. This class of work is but one instance of where the new metal should be melted clean and when no flux is used.

Figs. 2 and 3 show another job common in the garage welding department, the building-up of a worn crankpin. This work is done with special steel filler rods added in converging pools entirely around the worn portion. The metal is built on from the shoulder of the crank outward.

As each strip of new metal is applied, the crank is revolved on the V-block arrangement which is shown in the illustration. By revolving the shaft, the weld is kept in a horizontal position where it is under better control since it may be melted more fluidly without the tendency to run, and, therefore, the weld may be melted to greater depth before the filler is added which makes a stronger bond.

The flame is at the start brought close to the worn surface where it is revolved in circles that diminish as the melting increases until the flame is revolving in a circle about half an inch in diameter. As this circle starts to melt, the filler rod is brought close to the flame so when the crank metal melts, the rod is in a condition to be applied.

After the first pool is melted, the rod is kept in contact with the weld and gradually shifts to another part as that melts. Each succeeding pool is but a continuation of the preceding one. The metal is piled up enough around the shaft to furnish machining stock which is afterward turned off in a lathe.

This building-up process should be accomplished as rapidly as possible without forcing the melting. A forced weld is nearly always oxidized more or less and is, therefore, filled with pinholes.

The two examples given include but a few of the many worn parts that may be built up with the welding torch. The garage welder can easily find a great deal of work along this line and can as easily devise handy arrangements by which the work may be facilitated.

New Head of General Motors Means No Change in Sheridan Plans.

The election of Pierre S. Dupont as president of the General Motors Corp., to succeed W. C. Durant, means no change whatever in the plans and operations of the Sheridan Motor Car Co., the latest member of the General Motors group, is the assurance given by D. A. Burke, president of the Sheridan.

"We are more than pleased with the progress already made at our plant at Muncie, Ind.," said Mr. Burke, "and we

are especially gratified to note a constantly greater interest in the Sheridan, and a growing demand for it. Our dealer connections now extend from coast to coast, in the principal cities. The demand for our car is already in excess of production, dealers having voluntarily sent us orders for more than 2,000 cars.

"Many other dealers have filed their applications for Sheridan contracts, and agreements with these dealers will be written as rapidly as our production justifies. We feel it a duty to first take care of the needs of present dealers, and we do not propose to force local representation beyond production capacity."

The New Beck & Corbitt Catalog Is a Real Automotive Handbook.

Sixty-eight years of success is the record of the Beck & Corbitt Iron Co. And during these years the company has won for itself an international reputation. Its success, then, is complete—and there seems to be no other word that as accurately describes the new No. 13 which this establishment has just issued.

Nearly 700 pages—and they are well illustrated—describing equipment for the garage, the automobile and the motorist, are contained within the attractive green cloth covers. Everything in the way of automotive equipment, automotive supplies, and accessories, machinists' supplies, hardware, and tools, is interestingly dealt with.

Every garageman, repairman, and dealer will want further particulars of this truly remarkable book. Write to the Beck & Corbitt Iron Co., First St., St. Louis, Mo. It will be glad to send more complete details. When writing, mention this journal.

The Bassick Mfg. Co. Plans a Vigorous Campaign.

"If salesmen will cast off their wartime indolence and put on their ante-bellum battle togs, the New Year will be successful. Business men must realize that conditions have changed and that they must change their methods accordingly," says D. F. Fesler, vice-president and general manager of the Bassick Mfg. Co., of Chicago.

To show his confidence in the return of good business under the guidance of aggressive tactics, Mr. Fesler has planned a vigorous advertising campaign to exploit the Alemite high-pressure lubricating system and Thomson's graphite penetrating oil, two automobile necessities produced by his company.

"The need of the moment is for the old-time fighting salesman. He must go out and make business," Mr. Fesler continued. "Through the prosperous days, the selling personnel has grown soft. Each salesman must harden himself, get busy, go out and sell goods. Business is reorganizing itself on the pre-war competitive basis.

"I have every confidence in the future. I had no hesitancy in mapping out a com-

prehensive advertising campaign for our products. Advertising is essential at this time. It stimulates the market for any commodity and backs up the sales force in its struggle for business.

Addition to the Laminated Shim Family.

The time is not so long past when, in order to make a shim, it was necessary to take a piece of sheet metal, cut it down to a shape more or less approximating that of the bearing, and punch or drill holes in it for bolts. When enough had been cut with much labor and the bearing was adjusted, the result was still pretty sick looking, to say the least.

Among the many shims which have appeared from time to time on the market to remedy this condition, the laminated shim has been one of the most conspicuous successes. Repairmen and manufacturers have been quick to see the saving in time and labor of the "peel it" idea, says the Laminated Shim Co. Laminated stock shims for standard automotive bearings familiar throughout the trade.

The Laminated Shim Co. now announces a new addition to the family—Fit-All, "the laminated shim that can be cut to fit." As the name implies, it will fit nearly all shapes of bearings, either as is or with the help of a couple of snips with a tinners' shears. In short, it is claimed that the new Fit-All shim combines the advantages of the laminated shim with the universality of the sheet brass shim. The Fit-All, like its brothers in the Laminum family, comes in different thicknesses with holes punched in two different diameters.

More definite details concerning the new Fit-All can be obtained from the Laminated Shim Co., 47 West 34th St., New York City, or at the company's other offices, 1118 S. Michigan Ave., Chicago; Dime Bank Bldg., Detroit; or from the Mazura Mfg. Co., St. Louis, Mo.

Death of Prominent Oil-Burning Equipment Manufacturer.

Arthur E. Hauck, president of the Hauck Mfg. Co., died at his Flatbush home, Brooklyn, N. Y., October 30, age 41.

Mr. Hauck's career, beginning with his penniless start in America until his untimely death, is marked by untiring effort and devotion to his work. Many of the oil-burning equipments manufactured by the Hauck Mfg. Co. are the products of his invention.

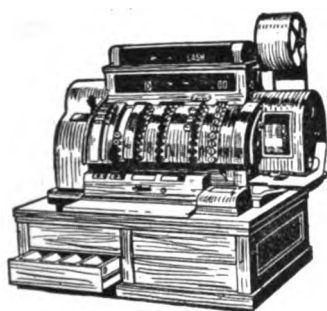
Paragraph.

THE WESTINGHOUSE ELECTRIC & MFG. Co., of Springfield, Mass., will have an exhibit of automotive apparatus during the Chicago Automobile Show, at the Hotel Congress, January 31 to February 5. Here will be on display the company's starting, lighting, ignition systems, and Bakelite-Micarta products.



Let him help you

**There is a better way to keep
the store records you need**



In your city there is a representative of The National Cash Register Company. He is a student of business systems. He has been trained to be of service to merchants—to help them solve their problems.

Let him show you how you can get the store records you need without working overtime on day books, pass books, ledgers, and memorandums.

He will show you the easiest way to get these records. You need them once a year for your Income Tax report. You need the same figures every day to control your business.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL

CASH REGISTER CO.

DAYTON, OHIO.

Up-to-the-Minute Garage Equipment

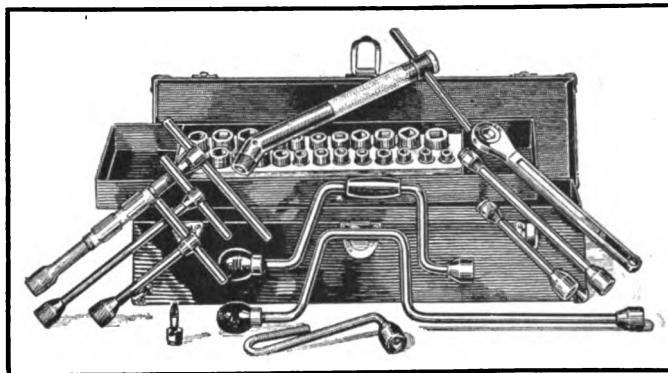
Success Is a Reality When You Have "The Tool for the Job."

Did you ever have to say—"I can't do it—I haven't the right tools?"

If you did, you know what follows. Embarrassment—on your part. Exit the cus-

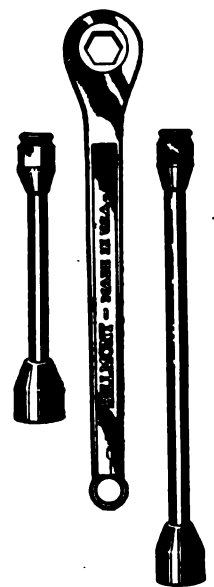
garageman is enabled to "make more wrenches" out of a single Billmont and a set of sockets than is possible with any wrench line made.

The reason is simple—each Billmont, because of its universal nosepiece, will take



Complete Billmont
Outfit in Strong
Metal Carrying
Kit.

The Ratchet
Wrench Has
Extensions for
Use on Deep-
Seated Nuts—
The Pawl is
Short and
Husky.



tomers. Curtain on that customer's future trade.

A bad penny always comes back—but a good customer never does unless he gets "what he wants when he wants it."

The foundation for your business success—in fact, for all business success, present and future, is to have the "tool for the job." And so it is with wrenches—it's the right wrench at the right time—and the manner in which they are made to endure stress and strains that count.

The Billmont line, manufactured by the Edgar C. Guthard Co., is said to consist of fewer wrenches than any other manufactured—and yet, because of the interchangeable sockets—an exclusive Billmont feature and a distinctly new idea—the

every Billmont socket. Hence, owning but one Billmont and a set of Billmont sockets (24 hexagon and square) gives the garageman 24 different wrenches, each with a different size opening. With a complete Billmont outfit of eight wrenches and the 24 sockets, 8 times 24 or 192 wrenches are made possible.

There isn't a place or part about the car that it isn't possible to reach with a Billmont combination. In fact, over 700 combinations, of which Billmont extensions make possible an enormous number, are provided for by the manufacturer.

For instance, the shanks of 6-inch and 11-inch extensions fit exactly into every wrench nosepiece in the line, and the socket opening of each extension will likewise take

every size in Billmont sockets. Therefore, it is possible to use one or both extensions together on any Billmont and thereby secure additional length and greater utility. A speeder with 24 interchangeable sockets becomes 24 speeders, plus one extension, makes 24 more speeders of added length and to this combination add the other extension and immediately you have 24 more speeders of great length.

So, with one set of 24 Billmont sockets, the speeder and two extensions

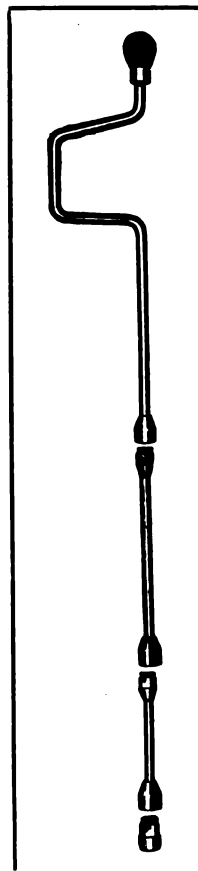
can be made into 96 different styles and sizes of speeders.

The steel used in all of these tools is 10-20 carbon, S. A. E. standard, heat-treated and hardened to lasting endurance. The sockets are cut from a solid bar, finely-machined, broached and hardened. The walls are of sufficient weight and thickness to resist the most stubborn nut.

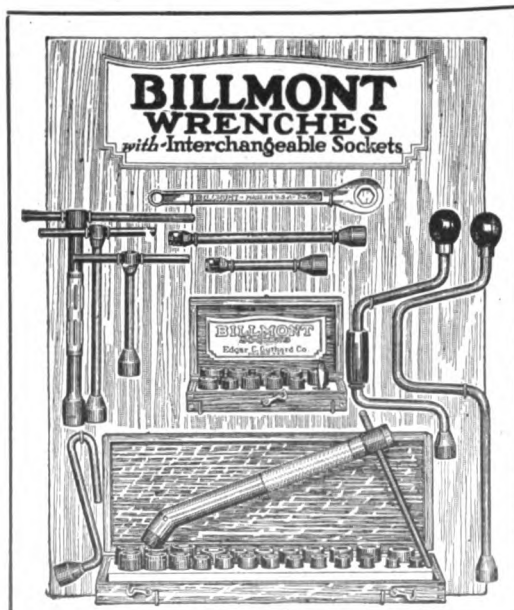
At the crucial moment, the Billmont socket does not break. It is guaranteed by its manufacturer to stand the "gaff" of every-day grueling hardships, for it is built for service. Every socket snaps into the Billmont nosepiece and is held firm by a spring-ring retainer. Yet, when you are ready to remove it, this can be easily done.

And so it is seen that the entire Billmont principle really means less wrenches, less space, less expense—but more jobs.

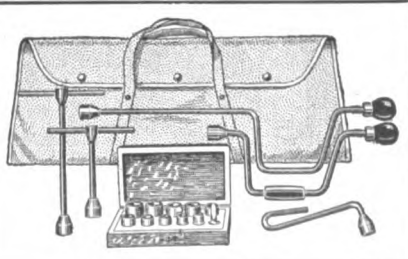
There is the Billmont No. 250 individual ratchet set. It



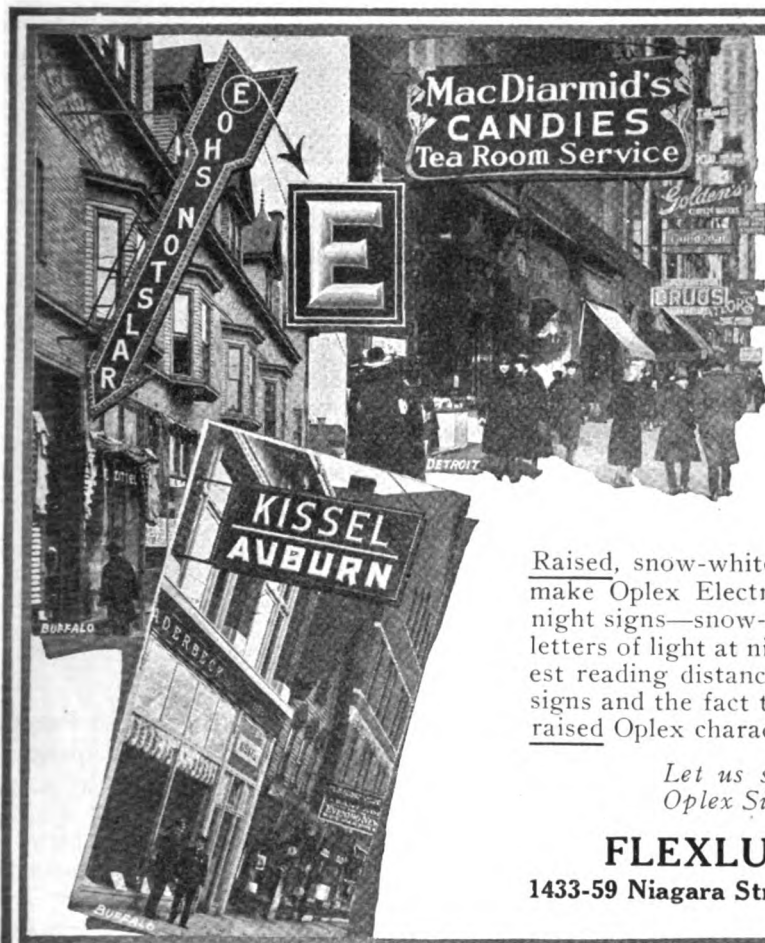
The Ratchet
Wrench Operates
in a Small Space
with Full "Pow-
er."



No. 155 Display Board is a Silent Salesman for Billmont Products.



A Strong Canvas Carrying Bag Makes Handy Kit.



Tell Your Car's Story In Raised Oplex Letters

TO increase the sales of the cars you handle, reproduce the makers' trademarks in the raised glass characters of a Flexlume Oplex Electric Sign. By doing so you will get the full value of his advertising. Expensive space has "sold" people on the cars. The Oplex sign will tell them where the cars can be bought.

Raised, snow-white glass letters on a darker background make Oplex Electric Signs splendid day signs as well as night signs—snow-white raised letters in the day time, solid letters of light at night. Other Oplex advantages are greatest reading distance, lowest upkeep cost, most artistic designs and the fact that any trademark can be reproduced in raised Oplex characters.

*Let us send you a sketch showing an
Oplex Sign for your particular business*

FLEXLUME SIGN COMPANY

1433-59 Niagara Street

Buffalo, N. Y.

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have earned to appreciate easy riding qualities secured through these shock absorbers.

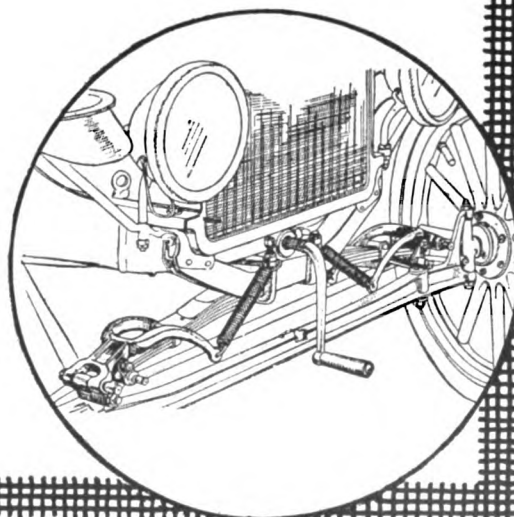
Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

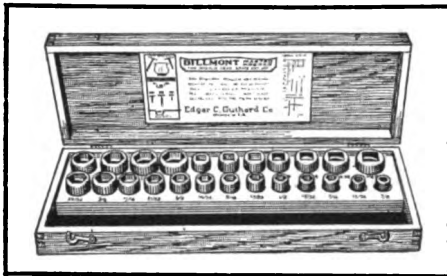
Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

is exceedingly compact, yet it is an outfit that will serve on many heretofore impossible jobs. It contains one No. 8 ratchet, one No. 9 extension, 6-inch, and



A Complete Range of Interchangeable Sockets.

five sockets—hex. $\frac{1}{2}$, $\frac{9}{16}$, $\frac{5}{8}$, $\frac{11}{16}$ and $\frac{3}{4}$ inch.

Billmont ratchet wrenches are drop-forged. They operate in the smallest possible space with full "power." One-half inch or more leeway is all that one needs. By turning the wrench over, the desired reverse action can be obtained. The pawl is short and husky and its manufacturer guarantees that it will not break or buckle. It is set into a solid steel recess instead of using a pin for its axis.

The ratchet is milled and specially heat-treated—the handle drop-forged and nickel-plated. Six-inch and 11-inch extensions snap into the opening for use on deep-seated nuts and the ratchet opening takes any and all Billmont sockets—rendering the great-

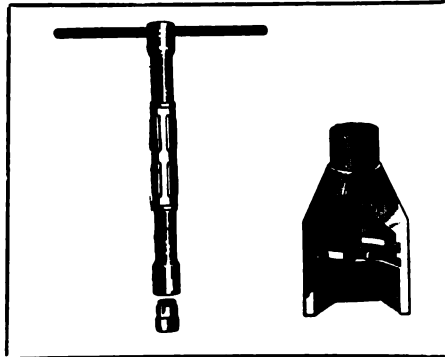
est possible utility in a tool of this type.

The Junior type wrench made by the Guthard company is a husky $11\frac{1}{2}$ -inch model of great strength and capacity cut from a solid bar of steel, nickel and Parker rust-proofed. It has a sliding T-bar handle for getting by obstructions. Any and all sizes of the interchangeable sockets can be used.

Garagemen will also be interested in the mechanic's kit, a complete outfit in a strong, durable metal carrying kit equipped with a heavy lock. The equivalent of 192 wrenches, or 768 combinations, is contained in this compact outfit.

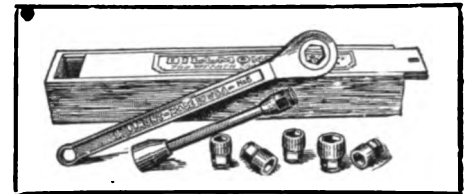
Strong canvas carrying bags are supplied for those who wish to use handy, compact and accessible kits.

Not only are garagemen appreciative of the fact that the use of Billmont wrenches



A Husky Wrench Is "The Junior" with a Sliding T-Bar Handle.

simplifies the work of the shop a thousand-fold but dealers are finding the line conducive to big business. Attention-attracting display boards are made by the com-



Individual Ratchet Set for Ratcheting Where Others Cannot.

pany to serve dealers as silent salesmen for these products. These display boards help to show merchandise to advantage and are furnished to purchasers of the No. 155 combination.

Write at once for further particulars concerning this complete and dependable line of wrenches to Edgar C. Guthard Co., 363 E. Ohio St., Chicago. And when you are writing, mention this journal.

Champion "Keeps Up the Pressure and Keeps Down the Expense."

"The best is none too good" is what the garageman of today says when he goes to purchase equipment. Durability and efficiency are two of the factors given thorough consideration, together with economy in operation and purchase price.

This is particularly true of purchasers

ROMORT

AIR and WATER STATION

Model S-D

Maximum Service at Minimum Cost

Counterbalanced arm with automatic return check.

Equipped with continuous air hose, Latest Improved ROMORT Automatic Air Valves, Water Valves, and Universal Hose Coupling.

Height base to head, 6 ft. Height to top of arm 12 ft. Radius of Air Hose $17\frac{1}{2}$ ft.

ROMORT

Air and Water Stations Advertise Your Business—Make Friends and Save Your Equipment.

Five models, for Curb, Wall and Ceiling

Write our sales dept. today for descriptive circular

Manufacturers
THE ROMORT MFG. CO.
Oakfield, Wis.

Made by the makers of the famous Romort Air Products

Sales Dept.
THE ZINKE CO.
1323 Michigan Ave.
Chicago Illinois

Cheaper Heat For Your Garage

Burn plentiful kerosene. Cost only half as much as coal. Better in every way for you—cheaper, cleaner, easier heat. No expensive coal pile to worry about. No dirt, safe. Guaranteed. Odorless.

VICTORY OIL STOVE

No Work—No Risk Burns Until Turned Off

Patented metal burner lights with match. Gives instantaneous heat. No time wasted. Stove throws terrific heat when desired, or will turn down as low as needed. Best heat imaginable for garage, office, workshop, etc. Will heat all three.

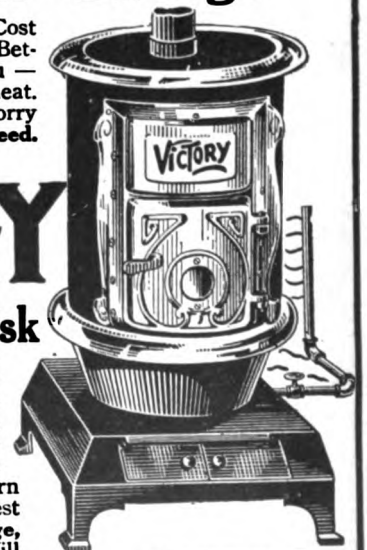
INVESTIGATE Write NOW for book, "The Sensible Heat for You." Sent FREE. Gives low factory prices, description and letters from garage owners.

AGENTS—Get our agent's and dealer's proposition. Some good territory still open.

Victory Oil Stove Co.

180 W. Austin Ave.

Chicago, Ill.



PROOF

Chicago, Ill.
"We have been using successfully and with satisfaction in our store one of the stoves. We find the stove odorless, easy to control and inexpensive of operation." Truly yours,
L. D. Wells Motor Co.
L. D. Wells, Pres.

A little grinding compound plus your ECLIPSE makes a perfect valve



It requires only a minute or so with the grinder and both valve face and seat are smoothed to a clean, hard finish—absolutely gas tight. No grooving or scoring—the rapid oscillation prevents all that and the slow rotation insures an equal amount of treatment to every part when you use the

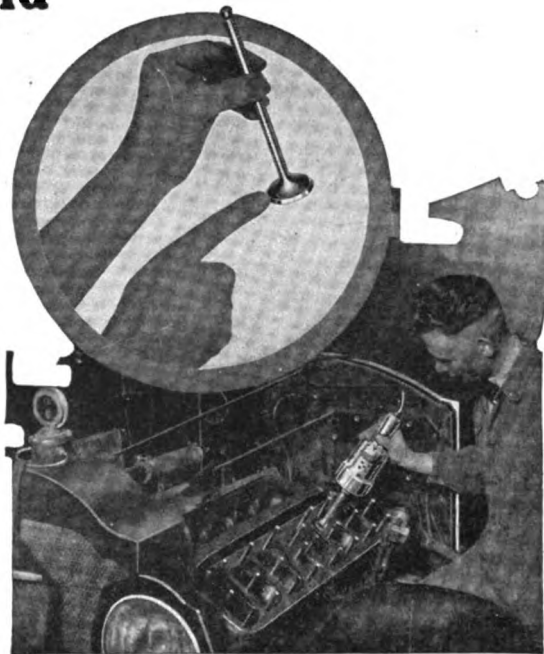
ECLIPSE ELECTRIC VALVE GRINDER

This tool sets a new standard in valve grinding and makes it a simple, easy task. It reduces the time and labor required to such an extent that the profit on each job is greatly increased.

It takes all the drudgery out of valve grinding. One hand suffices to guide the grinder and seat the valve perfectly.

The ECLIPSE VALVE GRINDER is a light, portable, electric-drive tool with ample power for grinding all sorts of automotive valves without over-straining. All moving parts are either grease packed or accessible for oiling, insuring a long life of hard service.

Write today for full description.

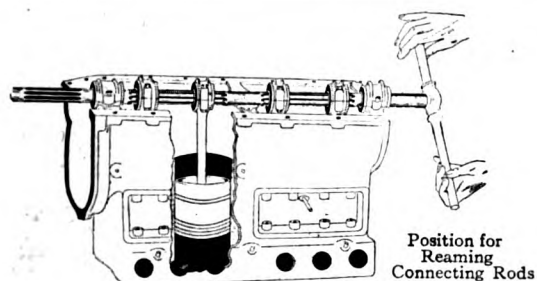


ECLIPSE VALVE GRINDER CO.

20th Street at Oak

Dept. C

Kansas City, Mo.



Position for
Reaming
Connecting Rods

The LEWIS REAMER Multiplies Profits

In more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

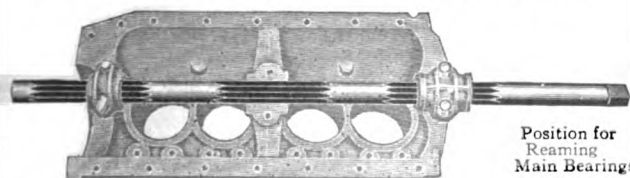
Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

Ask your jobber or write us today for particulars.

LEWIS TOOL COMPANY

612 Fifth Ave., South

Minneapolis, Minn.



Position for
Reaming
Main Bearings

Air! the life of the tire depends on it

Do not be afraid to press
the purchase of a
**SCHRADER UNIVERSAL
TIRE PRESSURE GAUGE**
on a customer.

He will thank you for it
after he discovers the
saving in both tires and
gasoline that it makes
possible.

Price \$1.50

A. Schrader's Son Inc.
783 Atlantic Ave., Brooklyn, N.Y.

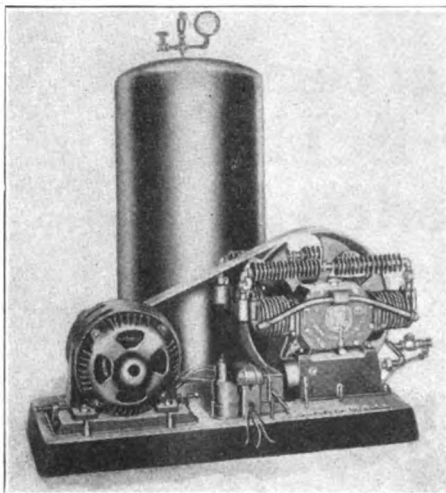


of air compressor outfits, and those who contemplate buying such equipment for 1921 will find the compressors of the Champion Pneumatic Machinery Co. in the class which gives admirable service. Two outfits for New Year buyers are being presented to the trade.

Equipment K-220—shown in the accompanying illustration—is a single-stage duplex automatic air unit which, according to its manufacturer, develops surprising efficiency, is low friction and consequently of long endurance.

The sturdy, close-coupled assembly, together with the construction held down to close limits, gives long life to this model. This outfit has a capacity per minute of 20 cu. ft., a working pressure of 150 lbs.

K-220 includes a Champion self-oiling duplex single-stage compressor, belted to a 3 H. P. motor for any current, with a sliding base for belt adjustment, all mounted on a metal base, complete, with filtering trap, belt, check valve, 60-gallon tank, 300-pound air pressure gage, needle-point air valve, pipe and fittings and safety valve. There is an automatic controller,



Equipment K-220 is a Single Stage Duplex Automatic Air Unit.

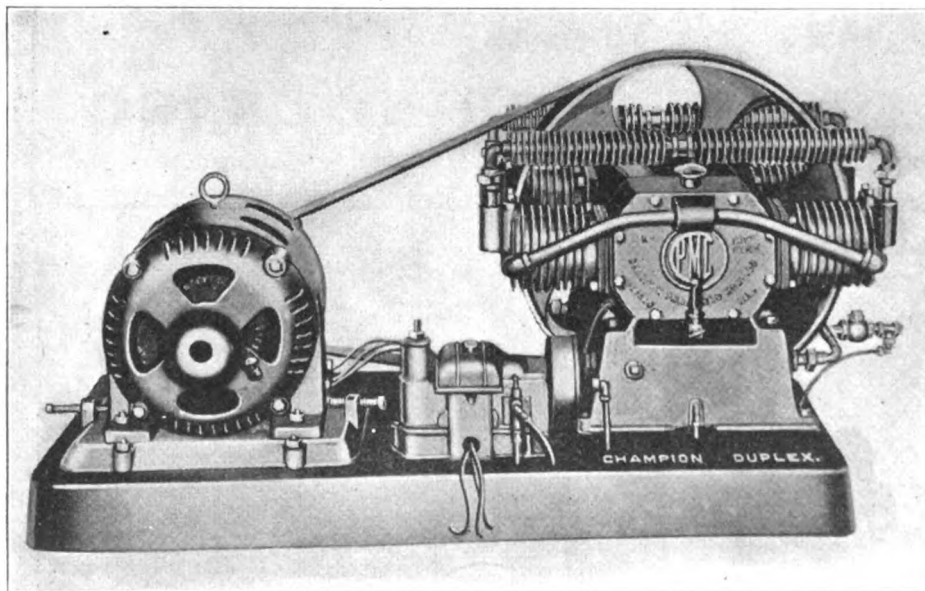
including a patented automatic pressure and moisture release valve complete and mounted on base with motor.

Garagemen will be interested in equipment K-217 Champion duplex single-stage compressor with electric motor drive, au-

tomatic controller and starting device. This unit is capable of pumping an exceptionally large volume of air for intermittent service. It contains four low-pressure cylinders, size 3 inches by 3 inches, and produces four air impulses at every revolution of the flywheel, a balance that cannot be equaled, says the company.

For service stations having a demand for large volume of air and for handling giant pneumatic truck tires, this outfit has been particularly designed. If desired, a tank will be furnished at an additional cost.

This outfit, K-217, includes a two-stage or single-stage duplexed self-oiling compressor, belted to a 1½ or 3 H. P. motor for any current, all mounted on a metal base, complete with filtering trap, check valve, belt and automatic belt tightener, automatic controller including an automatic pressure and moisture release. The outfit is complete and ready to run when connected with electric current.



The K-217 Champion Duplex Compressor is Capable of Pumping an Exceptionally Large Volume of Air for Intermittent Service.



Victory Visible Gasoline Pump

Gives everybody a square deal.

Puts an end to leaks and losses for the Dealer and wins the confidence and the trade of the motor-ing public.

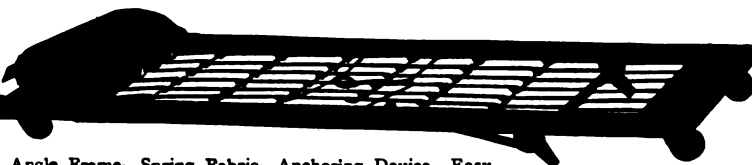
Order now before the spring rush

TOKHEIM OIL TANK & PUMP CO.

1600 Wabash Ave., FT. WAYNE, INDIANA

Foster

Auto Repair Creeper
METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

FOSTER BROS. MFG. CO., UTICA, N. Y., U. S. A.

\$5.00

Ask for the name of the Foster distributor in your territory.

DIRECT REPRESENTATIVES

Eastern and Southern States: Ash & Co., 16-24 W. 61st St., New York, N. Y. For the Mid-West: Jessop & Thompson, 1421 S. Michigan Ave., Chicago, Ill. Pacific Coast & Inter-mountain Territory: McDonald & Linforth, 739 Call Bldg., San Francisco, Cal.

Hickens "Sod-Tor-Lite" Set No. 2. 3 tools in 1.
A self-heating soldering iron, torch and light.
Necessary in every shop. No torch to generate, Copper pointers heat in one minute.

SATISFACTION GUARANTEED.
SENT ON TRIAL, PRICED LOW. Write.
B. E. HICKEN SOD-TOR-LITE CO.
BOX 490
Prairie Hill, Missouri

POINTS FOR SPECIAL RAINTER AND LUSTRE

TRY ONE

ACETYLENE

AUTOMOBILE SPRINGS
MANUFACTURERS AND SPRING SERVICE
GARDEN CITY SPRING WORKS
2300 Archer Ave. Chicago

Don't get Cold Feet— 1921 will reward fighters!

Buck up! Work hard! It's nonsense to think that business has gone to the "bow-wows". In sixty or ninety more days you'll forget that it was winter. 1920 was a big year for our dealers but 1921 will be a bigger year. *If you can measure up to our standard, we are prepared to show you that our specialties including*

**STORAGE BATTERIES
BATTERY REPAIR TOOLS
IGNITION PARTS
TIRE REPAIR EQUIPMENT
INNER TUBES equipped with Newsom Valves**

will make you substantial profits this year.

We are now appointing "red-blooded", energetic, optimistic dealers. If interested write.

Yours for Bigger Business Profits,

Ben A. Zeff Pres

R. T. MFG. & SALES CO.

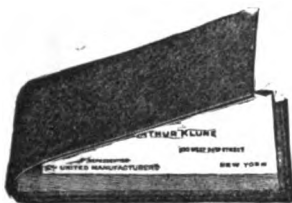
Sales Department:
3847 W. Madison St., Chicago, Ill.

Factory:
Green Bay, Wis.

Copy of "R. T." Catalog on Request



You've "Sent In Your Card"



What impression will it make in the mind of the man who receives it? He will judge *you and your business* by the quality and general character of *your card*. If it is a

WIGGINS Peerless Patented Book-Form Card

be assured that the right impression has been created. The door is open—the rest is up to you.

Wiggins cards used the country over because of the skill and care exercised in engraving a Wiggins plate. The convenient leather holder keeps the cards neat and clean.

Ask for a tab of specimens. Tear one off—note the clean, sharp edge and general excellence. Every card protected by thin tissue sheet.

The Jno. B. Wiggins Company

Established 1857

Engravers, Plate Makers, Die Embossers

1104 S. Wabash Ave. 705 Peoples Gas Building
CHICAGO



Automotive Wiring Manual

is what you need to render quicker and more accurate electrical service and make more money. There is nothing to equal it on the market at any price that gives you the authentic, down-to-date electrical information on any and all cars and trucks as contained in the new 1920 edition. Contains blueprints on all cars and trucks from 1912 to date.

Over 800 blueprints; over 600 models of cars; 200 Internals. Full size of blueprints, 7 1/4" x 11", large enough to be easily read; no need for magnifying glass to make out details. Bound in one volume, thus always complete, an advantage you cannot secure elsewhere.

QUIT GUESSING—KNOW

Your reputation as an Electrical Expert will not be made through an occasional lucky guess. You should know every time just what you are doing. The best assurance that you will is through the purchase of the Automotive Wiring Manual—1920 Edition. Price \$15.00 delivered.

Automotive Publishing Co.

448 South Dearborn St. : : : Chicago
910 So. Grand Ave., Los Angeles 41 E. 29th St., New York

You can build up a profitable Crankshaft Business

PROOF

(Are you interested in Profits
and satisfied customers?)

with
the
**WEBER
TOOL**

SEND FOR
THIS BOOK—
It will tell you—

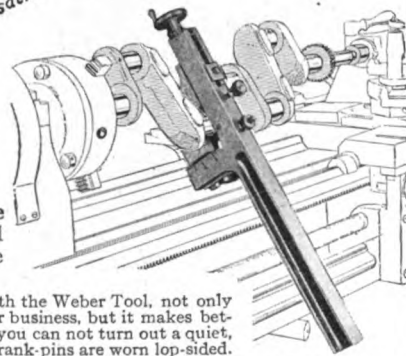
How garages, machine
shops and repairmen all
over the country are
doing it.

Truing up crankshafts with the Weber Tool, not only
adds a profitable line to your business, but it makes bet-
ter satisfied customers, for you can not turn out a quiet,
sweet running motor if the crank-pins are worn lop-sided.

With one setting of the crankshaft on centers,
you can turn all the crank-pins with the Weber
Tool absolutely round and straight to factory
standards, spending not more than ten to twenty
minutes per pin.

At your jobber or write direct.

SAWYER-WEBER TOOL MFG. CO.
342 So. Alameda St. Los Angeles, Cal.



GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial
in the automobile trade. Our unexcelled facili-
ties and broad experience enable us to give
you the most efficient service and engineering
advice on every kind of automobile gears and
transmissions.

We are prepared to furnish promptly trans-
mission, differential and timing gears, and any
other parts made from either open hearth,
nickel, chrome vanadium or any other alloy
steel, for any car of either American or for-
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guaranteed.

Write today and feel free to
consult our Engineering De-
partment.

Wm. Ganschow Company
1002 Washington Boulevard
Chicago, Illinois

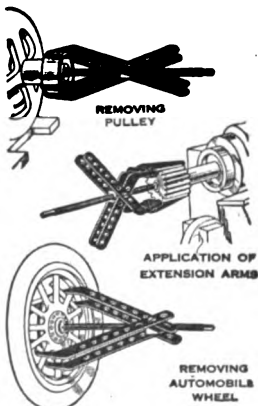


"LITTLE GIANT" GEAR AND WHEEL PULLER

Pulls any gear, wheel or pulley any-
where in a jiffy. Built on the only cor-
rect principle. Produces maximum ef-
ficiency with minimum effort. Can't
twist off or let go. **THE HARDER
THE PULL—THE TIGHTER THE
GRIP.** Reduces operating cost and in-
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Repair Shop. Made from best grade
drop forge steel. Almost unbreakable.
Adjustable up to 13 inches diameter.
Satisfaction guaranteed or money re-
funded. Order or write for details to-
day. Price complete with extension
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Liberal Discounts to Dealers.

Premier Electric Co.
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Lourie Improved Screw Arbor Press

EVERY AUTOMOBILE REPAIR
SHOP NEEDS THIS PRESS

Made in Two Sizes

32 in. between posts - \$75.00
42 in. " " - 80.00

We also manufacture a complete line
of Hydraulic Presses for every purpose
requiring pressure.

Write for Catalogue

LOURIE MFG. CO.
SPRINGFIELD, ILL.



Auto Repairing Profits

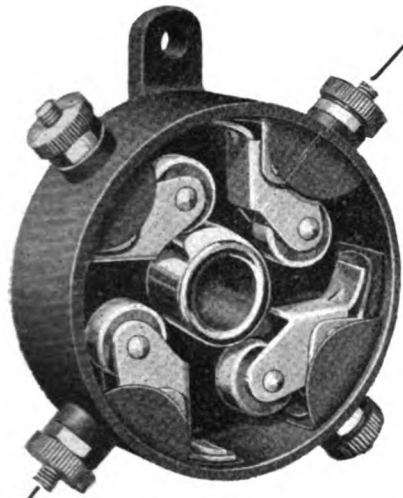
The profits of the repair shop depends to a large extent on the tools and
equipment you have to work with.

Write today for our catalog covering

Torit Oxy-Acetylene Torches

for soldering, brazing, battery work, radiator work, carbon burning, weld-
ing, etc.

ST. PAUL WELDING & MFG. CO.
174 W. 3rd Street ST. PAUL, MINN.



A Leaky Gas Tank?

**Wastes Gas!
Fix it?—of course**

But it is no more wasteful than the weak and irregular spark of an inefficient Ford Timer that burns but half the gas, the rest going out the exhaust unused and wasted.

Duntley Four Unit Timer

For Ford Cars, Trucks and Fordson Tractors

By its unfailing deliverance of a bigger, hotter, more constant spark the Duntley forces every atom of gas to yield its full measure of power, eliminating waste and effecting a saving in fuel that will pay for the timer itself in a short while.

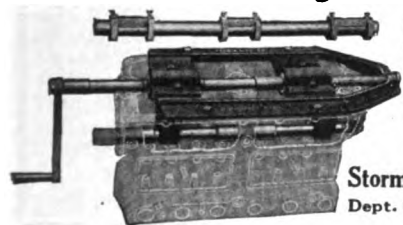
Dealers Note: Duntley sales are enormous. Are you getting your share of the profit? A postal will bring full details.

J. W. Duntley, 1004 Michigan Ave., Chicago, Ill.

STORM

MOTOR REPAIR EQUIPMENT

installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.
The Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

Storm Manufacturing Company
Dept. E Minneapolis, Minn.



Rose Tire Pumps Sell Themselves

The Rose Tire Pump's best advertisement is the satisfaction it gives. You can judge that from the fact that there are over 2,500,000 Rose Pumps in use today. Motorists know this pump, and they are buying large numbers of them every day. It's the pump that has made tire pumping *so easy*. If you want quick, easy sales, with good profits, sell the Rose Tire Pump. Write to your jobber today for information.

Frank Rose Mfg. Co., Hastings, Nebr.
Makers Rose Grease Guns and Buckets

FINCK'S

DETROIT SPECIAL

OVERALLS & COMBINATION SUITS

The Garage Man's Most Popular Work Garment

Slip into a Finck combination when next you need a work-suit. Note its generous fullness, its perfect design and the quality of material. You will see why Finck's are always preferred by men who put comfort, convenience and quality above price and save money by their policy. Most any good dealer can supply you, or write to us.

W. M. FINCK & CO.

Detroit, Michigan

**Manufacturers of High Grade Overalls,
Men's and Women's Combination Work Suits**

BRANCHES

St. Louis, Mo. Dallas, Texas
Seattle, Wash. Chattanooga, Tenn.
Livingston, Mont.

(61)



Handle Grease Easily — Swiftly — Cleanly with an O'BRIEN Heavy Duty Grease Pump

The easiest and quickest operating grease Pump on the market.

Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil.
Capacity 125 pounds or 15½ gallons oil.

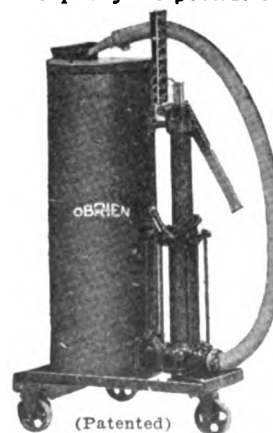
Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

**IT DOES YOUR
DIRTY WORK**

Ask your jobber about them or write us for complete information.

**The
Grease Pump Mfg. Co.**
1500 Michigan Blvd.
Chicago, Ill.



(Patented)



KENNEDY AUTO COVERS

*keep out dirt—
dust—moisture*

These covers are the best protection for cars in storage and for new cars which are not on display.
Made of strong heavy paper, properly reinforced, and furnished in standard sizes to fit any car.

KENNEDY CAR LINER @ BAG CO.
Canadian Factory at Woodstock, Ont. **SHELBYVILLE, IND.**



BEST BY TEST

AMERICAN ADJUSTABLE VALVE TOOLS

With these tools anyone can true to a perfect point of accuracy, any angle or degree—and size valve and seat 1" to 3" inclusive.

OVER 30,000 IN USE
Write for circular "B"

AMERICAN VALVE TOOL MFG. CO., 354 W. 50th St.
NEW YORK



Buckeye Cleanser

*The Auto Soap that
Cleans and Polishes*

The standard cleanser for autos and other painted or highly polished surfaces. Cleans quickly, preserves the finish, restores the lustre.

Made of pure vegetable oils—no grit, no acid, no alkali. Most jobbers have it. Money maker for dealers.

The Davies-Young Soap Co.
DAYTON, OHIO



Best for Garage Work Graham Socket Wrenches

Known throughout the automotive industry for their unexcelled strength and reliability. Turned from the best solid bar stock and heat treated.

No. 3 Set, shown herewith, meets the needs of garages and large cars. Eight sockets and handle packed in neat canvas bag.

Get literature and dealer prices.

Graham Roller Bearing Co.
COUDERSPORT, PA.

Price \$2.75

ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Use an

Atlas Grinding Tool

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crank case. Adjustable to all crank pins from 1 1/4 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5,000 in use. Send for circular describing

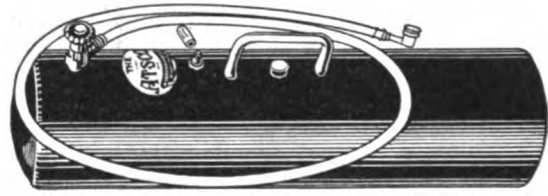
(Pat. Nov. 11, 1919)

ATLAS GARAGE UNIT

A machine for testing and straightening crankshafts, and gear press with housing assembly and piston vice attachments.

ATLAS MANUFACTURING COMPANY
Millvale Sta. "Dept. B" Pittsburgh, Pa.

PRICE \$10.00
complete
Net. Prepaid.
Extra cutters
30 cents each.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company Pittsburgh, Pa.



Keep your supplies in revolving cabinets like these

Systematic! Convenient! Accessible! Just like "rolling off a log" to look up bolts, screws, etc., with this revolving cabinet. Everything at your finger tips, with nothing to burden your memory. Used by leading garages of this country.

*Buy today from your jobber.
Catalogue on request.*

**American Bolt &
Screw Case Co.**
DAYTON, OHIO

When Springs Break, put on



VULCAN

The Replacement Spring

Our metal nameplate is on every genuine VULCAN spring for your protection.

If your jobber cannot supply you, write us—today.

JENKINS VULCAN SPRING CO.
Richmond,
Indiana.



Pat. 2-19-19.

Spark Plug Troubles Are Rare Occurrences on the car equipped with **UNIVERSAL SPARK PLUG INTENSIFIERS**

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These **INTENSIFIERS** will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBERs and DEALERs—Your profit is liberal.
Write today for our attractive proposition

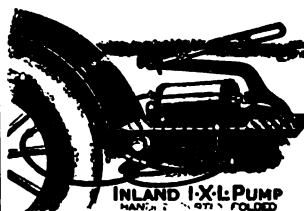
CLARKSON COMPANY

139 North Clarkson Court

CHICAGO, ILL.

INLAND I. X. L. PUMPS

**Excel in
Power
Compactness
Long Service
Ease of Operation**

INLAND I.X.L. PUMP
MADE IN U.S.A. FOLDED

This running board pump develops a leverage of 18 times the ordinary foot pump—a woman or child can operate it with ease. Strongly made of the best materials.

Cylinder is a drawn steel shell, absolutely air tight. Handsomely finished, making a neat appearance. Patent Folding Handle and Clamp. No loose parts to lose. Equipped with the famous

LOX-ON ATTACHMENT

which makes it easy to attach hose to the tire by merely turning a lever. Prevents leaks and the wear in the hose which results from twisting.

DEALERS—Write for data and prices

CLARKSON COMPANY
139 No. Clarkson Court, Chicago

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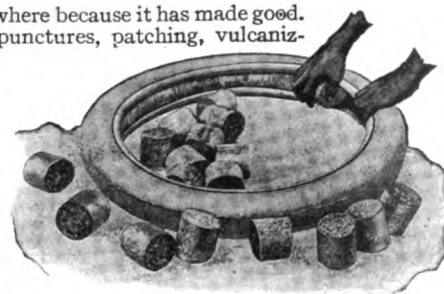
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Index to Advertisements

A	J
Accurate System & Manifold- ing Co., Inc. 56	Jenkins Vulcan Spring Co. 56
Air-Tight Steel Tank Co. 56	K
American Bolt & Screw Case Co. 56	Kastens, Henry —
American Valve Tool Mfg. Co. 56	Kennedy Car Liner & Bag Co. 56
Am-pe-co Sales Co. 57	L
Apco Mfg. Co., The. 57	Laminated Shim Co. 7
Atlas Auto Supply Co. 56	Lewis Tool Co. 51
Atlas Mfg. Co. 58	Lourie Mfg. Co. 54
Auto Engine Works —	M
Automatic Safety Tire Valve Corp. —	McDaniel Rubber Co., Leo. —
Automotive Publ. Co. 53	Marvel Carburetor Co. 35
B	Marvel Machinery Co. 3 and 5
Beck & Corbitt. 57	Meixell Co. —
Brunner Mfg. Co. 6	Millwaukee Tank Works. 61
Burd High Compression Ring Co. 57	Motor Salvage Co. 59
Burgess-Norton Mfg. Co. 59	N
Burlington Auto Supply Mfg. Co. —	National Cash Register Co. 47
Butler Mfg. Co. 58	National Refining Co. 41
Butterfield & Co. 37	National Rubber Filler Co. 57
C	New England Mills Co. —
Casco Mfg. Co. —	New Era Spring & Specialty Co. 4
Catalain, Andre G. 58	Norma Company of America, The —
Champion Pneumatic Machin- ery Co. 32-33	P
Channon-Hughson Co. 61	Paro, H. G. Co. —
Clark Co., W. L. —	Parts Service Co. 58
Clarkson Co. 57	Phillips, H. E. & Co. —
Coffield Tire Protector Co. —	Premier Electric Co. 54
Criterion Cap Co. —	R
Curtis Pneumatic Machinery Co. 35	Reynolds Spring Co. 61
D	Romort Mfg. Co. 50
Davies-Young Soap Co. 56	Rose Mfg. Co., Frank. 55
Duntley, J. W. 55	R. T. Mfg. & Sales Co. 53
Dunton Co., The M. W. Back Cover	S
E	Shaler Co., C. A. Front Cover
Eclipse Valve Grinder Co. 51	St. Paul Welding & Mfg. Co. 54
F	Sawyer-Weber Tool Mfg. Co. 54
Fairbanks Co. 57	Schrader's Sons, Inc., A. 51
Farm Journal —	Smith Co., The W. J. Inside Front Cover
Farr's Sure-Hold-Tire-Cement Co. —	States Chemical Co. 8
Federal Electric Co. —	Stiles Mfg. Co. —
Flick & Co., W. M. 55	Storm Mfg. Co. 55
Flexlume Sign Co. 49	Sunderland Machinery & Sup- ply Co. 58
Foster Bros. Mfg. Co. 52	T
G	Tokheim Oil Tank & Pump Co. 52
Ganschow Co., William. 54	U
Garden City Spring Works. 52	U. S. Air Compressor Co. 43
Gardner Governor Co. 31	V
General Utility Co. 62	Victory Oil Stove Co. 50
Globe Mfg. Co. Inside Back Cover	W
Goodrich Rubber Co., The E. F. —	Wagner Specialty Co. 58
Graham Roller Bearing Co., The 56	Warshawsky & Co. 58
Grease Pump Mfg. Co., The. 55	Washburn Burner Corp. —
Green Engineering Co. 58	Webber & Co., P. H. 49
Greer College of Motoring. 59	Weston Electrical Instrument Co. —
H	Wiggins Co., The John B. 53
Harner Mfg. Co., E. C. —	Worcester Abrasive Co. 39
Harvey Spring & Forging Co. 45	Z
Hauk Mfg. Co. 4	Zinke Co. 50 and 61
Heiser Special Tool Co. —	
Hermann, J. 59	
Hicken Sod-Tor-Lite Co., B. E. 52	

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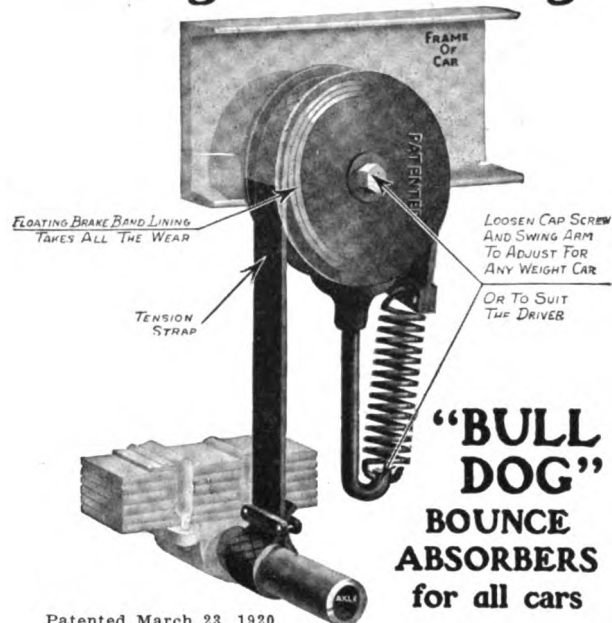
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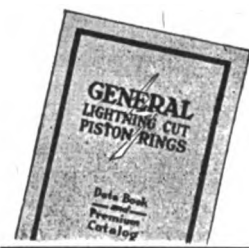
What happens to a particle of carbon? It flows *downhill* through the wandering

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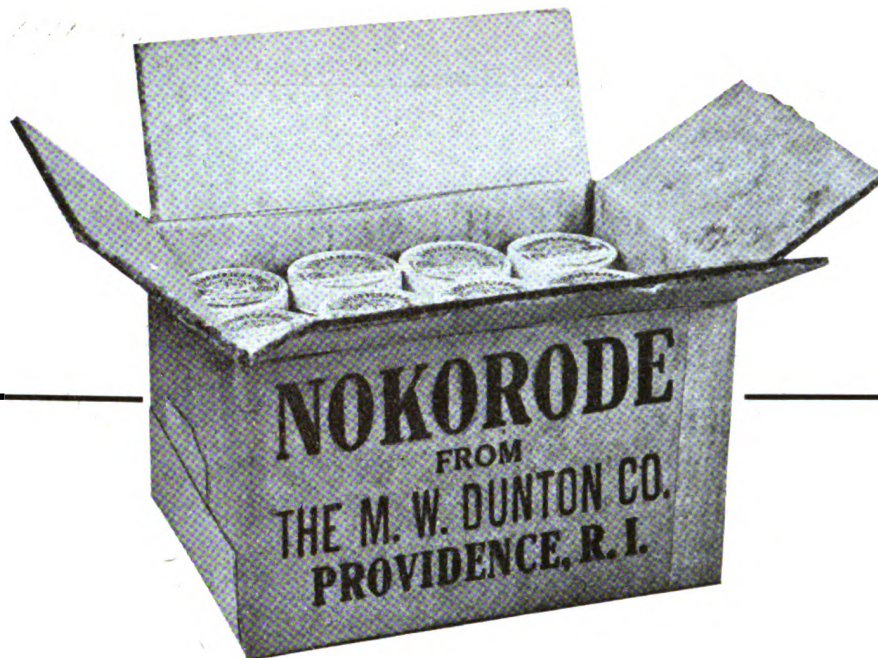
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**"Globe SUPER Two-Stage"
to Your Jobber**

and if necessary, insist upon it, if you want to furnish **real air service.**

GLOBE MANUFACTURING COMPANY
BATTLE CREEK, MICHIGAN



To always be sure of having a supply order **NOKORODE** by the case

You will find it a good investment from several standpoints—the money saved by taking advantage of the case price is only one of them.

A still greater benefit is the assurance that *all* your soldering work will be properly done. When NOKORODE is used, no corrosion follows, as this soldering paste is absolutely non-corrosive and harmless to metals. There is no soldering job on an automobile or truck that NOKORODE will not do better.

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*Cases contain either 36 2-ounce or
6 1-pound cans, \$4.50 each f. o. b.
Providence or at your regular jobbers.*



Reg. U. S. Pat. Off.

The M. W. Dunton Company
Providence, R. I., U. S. A.

American Garage & Auto Dealer

Published Monthly
118 So. Michigan Ave.
CHICAGO, ILL.

FEBRUARY, 1921

Vol. 12.—No. 2,
10 Cents the Copy
\$1.00 Per Year.

A Friend in Need

*Easier Than Sticking on a
Temporary Cold Patch*

Quicker Than Changing Tubes

The Shaler 5-Minute Vulcanizer makes permanent, heat vulcanized repairs that will not come off—stronger than the tube itself. No cement—no gasoline—no flame. Simple, sure, safe, satisfactory. Over a million motorists carry this convenient "Friend in Need" in their cars to protect themselves against the annoyance and delays of puncture troubles.

Complete Outfit **\$1⁵⁰**

At All Auto Supply Stores

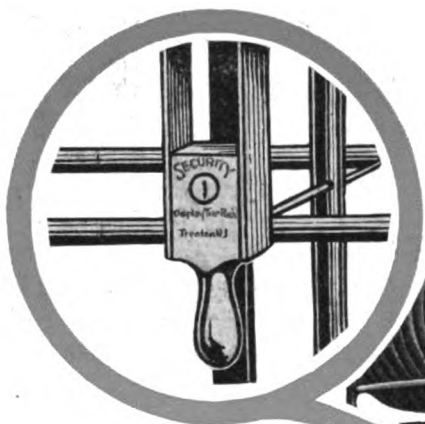
The outfit includes the vulcanizer—12 Patch-&-Heat Units (6 round for punctures, and 6 oblong for cuts) price complete \$1.50. (Slightly higher west of the Rockies and in Canada.) Extra Patch-&-Heat Units 75c a dozen.

C. A. Shaler Co.
351 Fourth St., Waupun, Wis.



Security Display Tire Rack

GUARDS STOCK—SELLS TIRES—SAVES SPACE

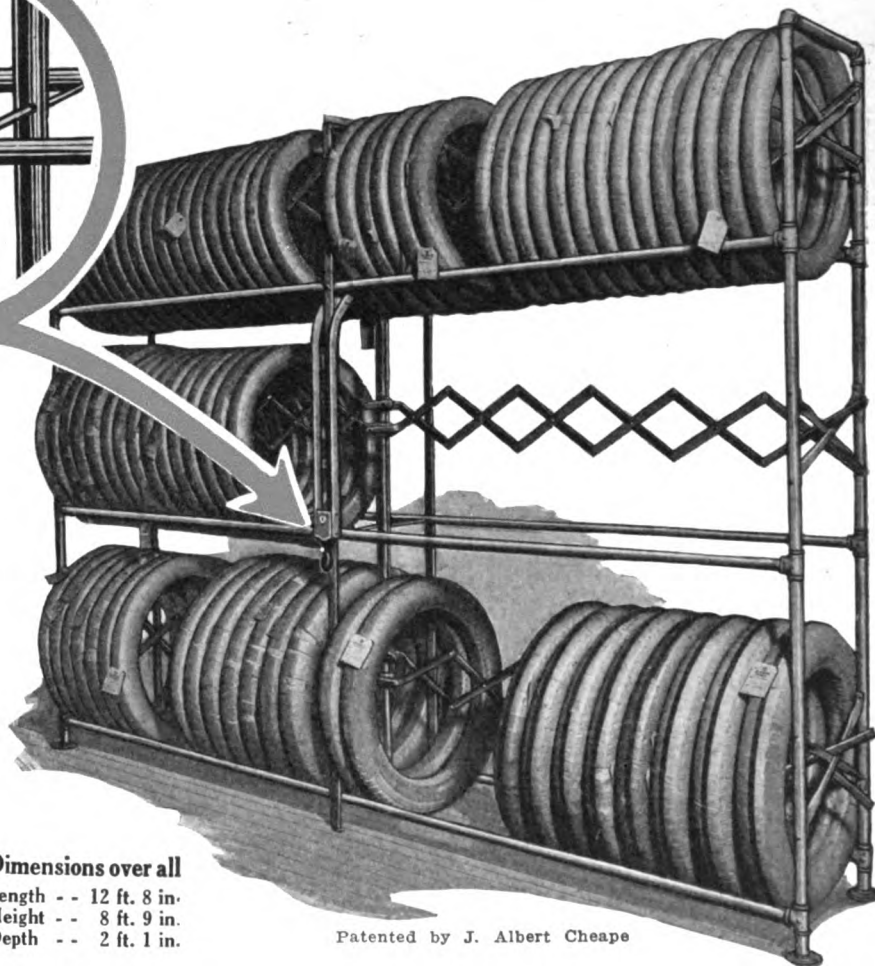


The Security Display Tire Rack enables you to exhibit your tires in a neat and attractive way. No more dark corner or back room show places necessary—it keeps your tire stock "ON DISPLAY".

Not only does the Security Display Tire Rack boost your tire sales, but it puts a stop to all losses by theft; by damage; by depreciation. Oil, gas and dirt injure tires—the Security Display Tire Rack keeps your tires off the floor, free from all damage. All tires rest upon the tread, having two points of contact, keeping them in perfect shape at all times.

Dimensions over all
Length - - 12 ft. 8 in.
Height - - 8 ft. 9 in.
Depth - - 2 ft. 1 in.

Patented by J. Albert Cheape



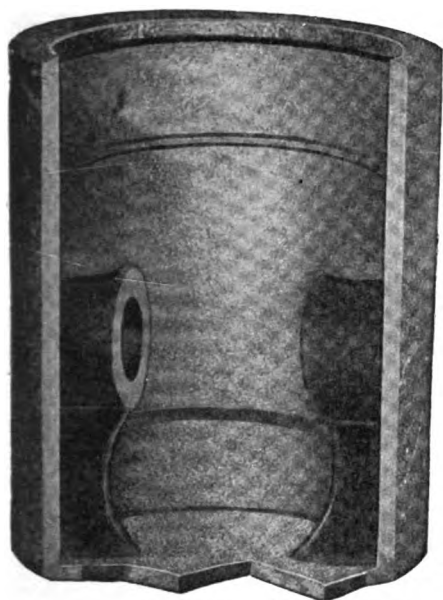
The Security Display Tire Rack is of all steel construction and is backed by an ironclad guarantee. It is simple, yet positive in action. One operation only is necessary in opening or closing rack. To open, simply raise lever arm which draws the lazy tongs to a closed position, allowing any tire on the rack to be lifted out. The arm when raised is six feet four inches (6'4") from floor, giving ample clearance on all sides. The handle is equipped with Yale Spring Lock, which locks the arm securely to frame of rack. Absolute protection against loss.

The Security Display Tire Rack will be your biggest tire sale booster for 1921, as well as insurance against losses of all kinds. You owe it to yourself to learn more about our offer.

Let us tell you all about it



THE W. J. SMITH COMPANY
1834 BROADWAY -:- NEW YORK, N. Y.



MARCO— The PISTON SUPREME

It's Not How a Piston Looks—It's How It Acts That Counts

Marco reputation is built on performance. They are made of selected, close grained grey iron of the best quality and in accordance with the specifications of the Society of Automotive Engineers. Every item entering into their construction is tested—each charge in the cupola is chemically analyzed. The side walls are light but substantial—they are reinforced underneath the head and around the base. MARCO Pistons are as light as practical, as strong as required to give excess of power, range and flexibility.

MARCO ON PISTONS IS AS STERLING ON SILVER

There may be other Pistons but there is only one MARCO—unapproached—unequaled. Do away with Piston troubles, use MARCO Pistons. Loss of compression, fouled spark plugs, piston slap, sticking, excessive pumping of oil are unknown with the MARCO.

Specify—insist upon, and use only Marco Pistons. Recommended and used by particular automotive repairmen.

Marco Quality Unequaled—Marco Service Unexcelled

We are in position to render prompt service on Marco Pistons. We have patterns for 2,500 makes and models of internal combustion engines—from motorcycles to trucks. Marco Pistons are furnished in the rough, semi-finished or finished to the following standard oversizes: .020, .031, .046, .062.

Write for our latest pattern list at once.



*The Sign of a
Perfect Piston*

MARVEL MACHINERY COMPANY

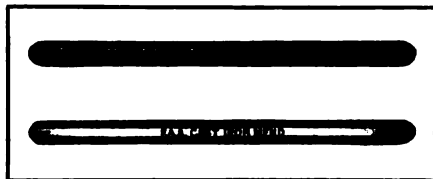
510 Loan & Trust Building
Minneapolis, Minn.



*The Sign of a
Perfect Piston*

NEW WELDING and SOLDERING Compounds

"Perfect substitutes for Acetylene Welding"



F. A. A. ALUMINUM and CAST IRON MENDS

Used to repair defective or scored cylinders, cracked water jackets, crank cases and other aluminum or iron parts.

Send for trial order and directions
DEALERS:—Write for territory and terms

F. A. ALBERTUS & COMPANY
206 9th Street Milwaukee, Wis.

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Business Conditions Sound.....	9
Effort Brings Its Reward.....	9
True Meaning of "Economic".....	10
Why Good Roads?.....	10
Let the People Know.....	10

GENERAL

"Fix It Yo' Self" Shop Appeals to All, by Charles Abbott Goddard.....	11-12
Chicago Show Breaks "Buyers' Strike".....	12
Who Sells Accessories in Your Town? by Fred Counterman.....	13-14
Think Before You Cancel Contracts, by Chesla C. Sherlock.....	15
Cartoon.....	16
If It Ain't Rite Give Munny Back, by Frank Farrington.....	19-20
Overhaul Jobs—The Service Basis, by J. N. Bagley.....	21-22-23
Teach Customers Care of Tractors, by F. H. Sweet..	24
Gasolene Explosions.....	25
Plans for the Easter Display Window, by A. Pearl McPherson.....	26
Glimpses in the Garageman's World.....	27

DEPARTMENTS

Accounting, by J. Newton Boddy.....	17-18
Welding, Cutting and Brazing Practice, by David Baxter.....	28-29-36
Practical Hints for Shop Mechanics.....	32-34
Readers' Questions and Answers.....	30-31
Accessories—Dealers' Key to Profits.....	38-40
Up-to-the-Minute Garage Equipment.....	42-44-46
Here and There in the Motor World.....	48-50

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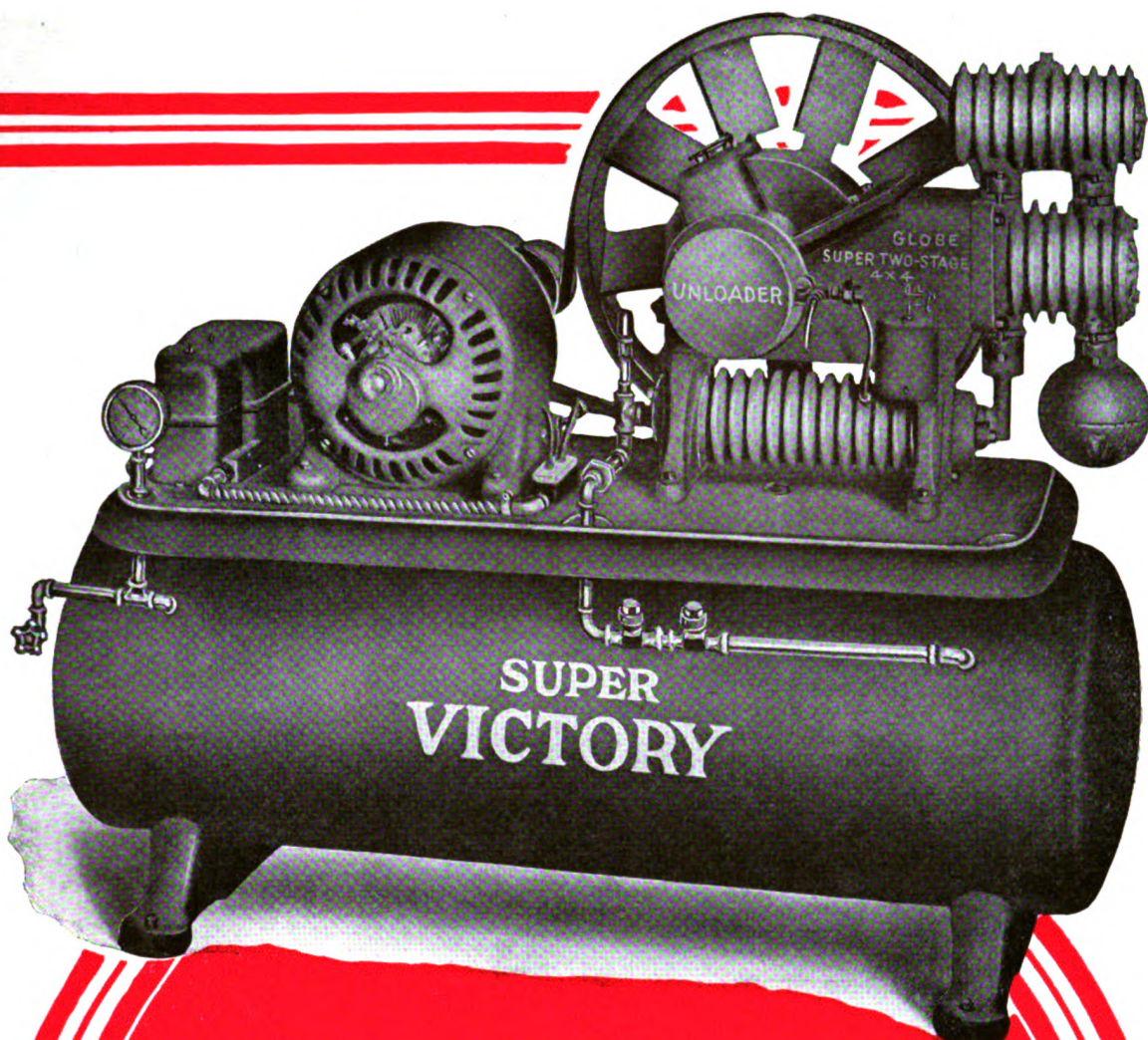
Comfort and Safety for Ford Drivers



ALL - IN - ONE RADIUS ROD & SUPPORT

insures the Ford owner against radius rod trouble for the life of his car, gives positive protection against accident and makes steering much easier. Made from four pieces of heavy steel tubing, welded into one solid piece making an absolutely rigid support for the front axle.

A BIG SELLER TO FORD OWNERS
If your jobber cannot supply you, write us.
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Marshalltown Iowa



Make your Air Service an Asset

to your business—not merely a necessary expense. Install the compressor that combines top-notch service with economy.

GLOBE SUPER TWO-STAGE

A two-stage compressor having but a single light weight piston, only one cylinder, one connecting rod and no stuffing boxes. It combines all of the desirable features of both single-stage and all other types of two-stage compressors, without any of the disadvantages of either. Scrupulous care has been employed in every detail of construction of this compressor assuring a long life under the most exacting service conditions.

THE GLOBE SUPER TWO-STAGE inflates giant pneumatics and all other tires as easily as toy balloons. It develops as high as 250 or 300 pounds pressure. It always starts easily and instantly

This compressor will enable you to give the best air service in your community.

Ask your jobber or write us for complete information.

GLOBE MANUFACTURING COMPANY

BATTLE CREEK

MICHIGAN

BRUNNER

REDUCED PRICES AND NEW MODELS

Reduced prices are announced in the new Brunner Catalogue. It describes in detail twenty different types of compressors, and a complete line of air fittings—all at the new FAIR PRICE schedule.

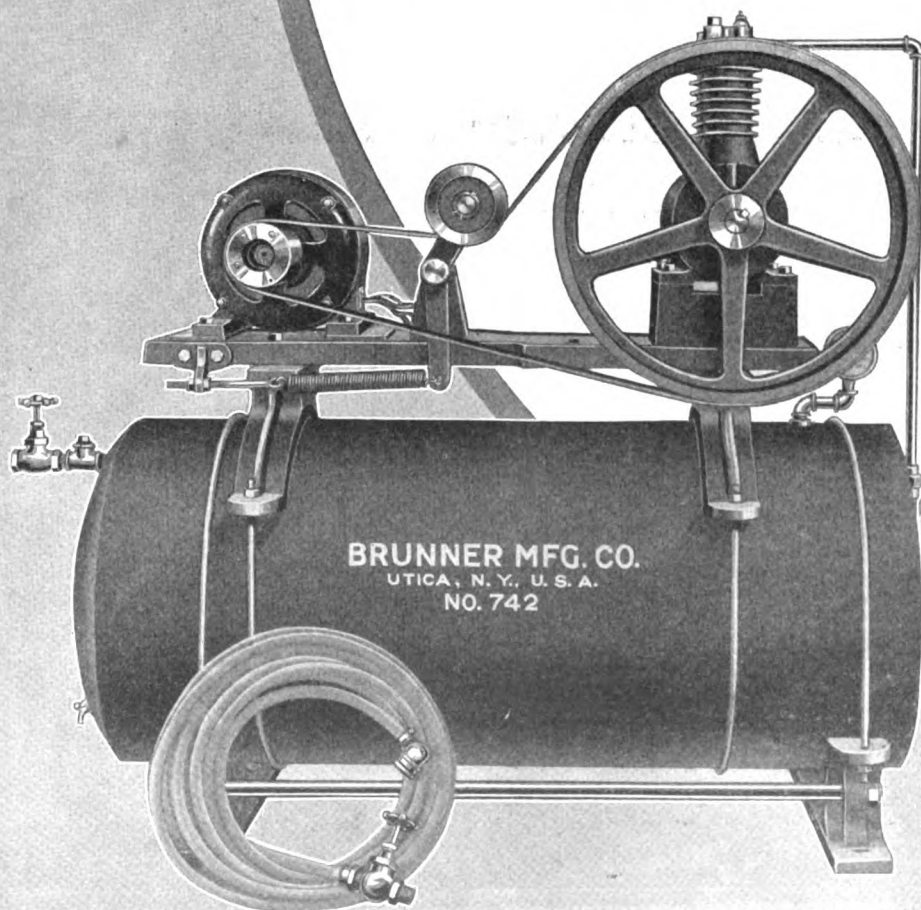
You know your requirements. We show the correct machine for your place and tell what it will do. Send to-day for this complete book and special discounts.



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Just Clip and Peel!



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The Shim
That Can
Be Cut
To Fit

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Save Time and Money

A few snips with the shears will fit the new FIT-ALL shim to almost any single bolt bearing. FIT-ALL is a Laminated Shim—a real time and trouble saver.

Holes already punched: 13/32" for 3/8" bolts, 17/32" for 1/2" and 7/16" bolts. Laminations .003"; thicknesses 1/32" and 1/64". In packages of 25 shims.

Address "Sample Manager"

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Ask him to
try one
can of
SPEE-DEE

Every man who drives a car has to stop once in a while to make some adjustment that leaves his hands soiled. In cold weather the use of gasoline or water to wash up afterwards means chapped or cracked hands. In such a case, a can of SPEE-DEE is positively invaluable. This compound

Cleans Greasy, Grimy Hands with or without water

and without injury to the skin. This feature makes SPEE-DEE indispensable in winter, and the man who is acquainted with it always carries a can when driving.

NOW is the ideal time to introduce SPEE-DEE to your customers. Any car owner will buy a can *at this time of year* when you show him how it will clean grimy hands without water. *The man who purchases a can for the first time will find it useful for so many purposes that he will be back—again and again—for more.* The price is so moderate that the user gets Big Value for his money.

SPEE-DEE is unexcelled for removing spots from clothing and has many household uses. See label.

A SPEE-DEE dealership carries with it a steady, profitable business.

*Write today for full details or
dealers' selling helps.*

STATES CHEMICAL COMPANY
680 W. Austin Ave. Chicago, Illinois



American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 2.

CHICAGO

February, 1921

Business Conditions Sound.

The nearer the approach of spring, the more favorable are business conditions becoming. Reports from the East tell of improving conditions in many lines of industry.

It is true that not all retailers have done the needful thing and the country must wait until everybody gets into the game. The automobile industry did the needful thing last fall and is now slowly recovering from the major operation. The plants in Detroit are gradually opening up and there are many straws that show there will be a healthy resumption of activity in the automobile industry.

The automobile shows have usually proved a barometer of what might be expected—and this year the shows so far held have been most encouraging. The attendance has been greater in most cases and there have been a surprising number of sales, all things considered. In addition the people visiting the shows have taken a great interest in the exhibits, asking for information and readily giving their names and addresses. The dealers have thus obtained excellent lists of prospective buyers.

It is believed, however, that the sales this year will be mainly of the medium-priced cars, for the reason that the wage earners who have drawn such high wages in the past two or three years are cutting expenses in every way to meet the lower wages they are receiving, or anticipate receiving, if they are fortunate enough to be employed at all.

Business men generally believe that we are in for a period of good old-fashioned prosperity as soon as the poison which brought about the depression through which we are pass-

The chief factor in the success of each man—wage-worker, farmer and capitalist alike—must ever be the sum total of his own individual qualities and abilities. The slightest study of business conditions will satisfy anyone capable of forming a judgment that the personal equation is the most important factor in a business operation; that the business ability of the man at the head of any business concern, big or little, is usually the factor which fixes the gulf between striking success and hopeless failure. Each man must work for himself and unless he so works, no outside help can avail him.—Theodore Roosevelt.

ing, has been eradicated from our systems.

W. P. G. Harding, governor of the Federal Reserve Board, in a recent address said:

"We are now looking forward to a year of constructive development. I want to say that intrinsically there is no comparison today with conditions a year ago, when there was uneasiness and apprehension among the best informed over the badly-expanded credit. Business is now rapidly reaching a new level and approaching a sound and sane basis."

Effort Brings Its Reward.

"Speed up! There are no hard times coming. It's just the soft times going!"

There is a slogan that is right to

the point and expressive of actual conditions! The soft times in the automobile industry have gone.

For several years we were traveling only on the mountain tops and few went down into the thickly-populated valleys nestling below, which are filled with rich business opportunities.

We were enjoying the soft times and were hitting only the high spots. The low spots were neglected because it was easier traveling across the high spots. Now, however, we are finding that the low spots contain the rich business opportunities—if we will make the necessary effort to find them.

The day of the passive attitude in salesmanship is past. The active attitude must be assumed. It is easy enough to say, "Your Royal Eight is ready." How much more effective is "Your Royal Eight is ready, Mr. Johnson." That is active and creates a favorable attitude in Mr. Johnson's mind.

True, doing things does involve effort, but you will get exactly what you give. If you do not give you do not get. Have you observed the attention given public speakers, particularly those making appeals for charitable purposes. One will be attentively listened to while another can not hold his audience. He may work just as hard as the other but if he looked in a mirror and saw the expression on his face, he would understand why his audience did not warm

to him. In other words, he received exactly what he gave.

At a recent convention of salesmen, there was much pessimistic talk and a general atmosphere of blueness prevailed. Suddenly a vice-president of the company leaped to the platform and called for the company bootblack, declaring his intention of getting a shoeshine. The 800 salesmen present were aghast, for it had previously been stated that the meeting was costing the company \$250 a minute.

When the bootblack finished his work, which cost the company \$1,250, the vice-president told the story of three bootblacks. Two of them had failed to make the \$4 a day guaranteed by the company. But the third—the one whom they had just seen at work—with no more territory or prospective customers, did more business, and earns three times as much as the others did.

"Gentlemen," concluded the official, "it's not the territory that counts—it's the man!"

The bootblack's success proves the point—"effort is always rewarded."

True Meaning of "Economic."

Economic questions will comprise 90 per cent of the problems of the next generation, according to Herbert Hoover. And being economic, they will be largely industrial.

In the past few years we have heard much of that word "economic" and it appears that we are to become still better acquainted with it. Recently it was analyzed letter by letter in connection with its application to business and business men. Here is the way the analysis went:

E—Experience.

C—Conservatism.

O—Optimism—it puts "pep" into any business.

N—Non-jealousy.

O—On-the-square.

M—Manliness.

I—Intimate knowledge.

C—Consideration.

Any of the words of this analysis can be discussed at considerable

length but we'll let each one who reads this do that for himself. It's easy enough for any automotive man to see the application of this word "economic" to himself and his business. The words in the analysis form an excellent guide to success.

Why Good Roads?

"The use of our highways has increased from 500 to 1,000 per cent during the last five years," declared Thomas H. MacDonald, chief of the Federal Bureau of Public Roads, at the National Good Roads Congress in Chicago this month. "The development of the motor truck has been so rapid that the adaptation of this vehicle to the roadways over which it operates has been seriously neglected.

"After all, the motor truck is the determining factor in the cost and

Eight hours of sleep, simple, wholesome, well-prepared food, temperate habits, and plenty of fresh air, are the best possible means of keeping one's self mentally alert and physically fit. Don't be satisfied to READ THAT and to say, "What a chestnut! Give us something new!" The point is: Do you put the ideas in practice REGULARLY and with intelligence, or are you satisfied to let George do it if he wants to, while you do as you please?

building of roads, and a problem that is national in its scope is that of an early agreement between road-builders and road-users as to the maximum load to be carried.

"The 1½ billion dollars now available in the United States for road-building will do much to relieve the present unemployment, and will spread miles of smiles over the faces of the users of the motor truck and the passenger automobile."

With virtually nine million motor vehicles now plying the 2½ million miles of highways of the country, a trained personnel will be needed to administer the vast sums of money which will be set aside for highway construction and maintenance, while

literally thousands of others will be required to build and operate the fleets of motor vehicles which authorities forecast will shortly be supplementing railway and waterway facilities.

The National Automobile Chamber of Commerce recognizes the importance of good roads to the automobile industry. Edward S. Jordan of its highways committee urges a federal highway commission to handle the road question and make surveys of utmost value to the movement.

A national policy could be shaped by such a commission with the cooperation of state officials, which would take into account national as well as state needs. And national, state and county highways could be built and maintained with the soundest possible expenditure of funds.

Good roads and the automobile industry have so much in common that all automotive dealers should take the greatest interest in the building of good roads. The better the roads, the greater the number of cars.

Let the People Know.

Just recently, a man in close touch with business conditions declared that of all the failures recorded in 1920, 80 per cent of them were of firms which did not advertise. It is human nature to economize in times of business depression. But it is good business foresight to advertise during such periods, for people will buy what you have to sell—if you sell what they need.

The automotive dealer sells what people need—and they will buy his accessories and supplies and his repair services, for the nine million cars in service in this country today require new accessories and repairs of various kinds. The automotive dealer who advertises and goes after his business aggressively will be surprised to see how much new business can be developed.

Let the people know that you sell what they need—then you will sell what you have to sell.

"Fix It Yo'self Shop" Appeals to All

Novel Idea Which Finds Favor with Folks Who Like to Make Their Own Repairs Because of Economy or Pleasure of "Doing It"—"Self-Service" Shop Seems to Supply Need — Expert Mechanic Helps if Patrons Get "Stuck"

By Charles Abbott Goddard

W. D. Candee, 1041 South Broadway, Los Angeles, Calif., has taken a tip from the cafeteria, grocerteria and other "help-yourself" institutions and put his garage on a fix-it-yourself basis, even naming his shop accordingly.

And it appeals not only to the men who desire to economize on labor but haven't the tools, but also to the man of means who just will not let any other hands touch his pet car.

The patrons, however, are to quite a large extent among those who say: "I could fix that in a jiffy, and so it would sing, if I just had the tools."

At any rate, the independents who appreciate a chance to "use what God gave you," find it at the "Fix it Yo'self Shop," which W. D. Candee opened for folks who like to tinker with tools, or for those who are moved by the pinch of economy.

There are only three known "fix-it-yourself" shops in the United States—one in Philadelphia, one in Cincinnati and one in the Nevada gold fields. Candee's makes the fourth.

They're all paying because they seem to supply a long-felt need—the

place and equipment where a man whose fingers aren't all thumbs, can fuss with the insides of his li'l old flivver, or can put splints on the fractured limb of his kitchen chair, with-

posted a scale of prices, also in cafeteria style.

The room has a number of separate booths, for which he makes a small rental charge, each numbered and containing a bench, a drill, a lathe, etc. There is also modern equipment and machinery for repairing automobiles, and machinery for doing carpenter work, blacksmith work, plumbing (ah, triumphant day when one can beat the plumber at his own game) and electric work.

You can even build your own house with tools furnished by Candee. The only requirement is that you make a deposit for the

value of the tools, which is returned to you when you bring the tools back, minus the small rental fee.

Another part of the "Fix it Yo'self Shop" which is very popular is the wash rack. Many people while not mechanics do like to wash and oil their own cars. At Candee's all the facilities—compressed air, hot and cold water—are provided for doing the work rapidly and well.

Candee's customers are of all classes, but many of them come in classy cars. The other day a well-dressed



Unique Garage and Repair Shop—Only Three Others in Country Like It.

out feeling, as patrons of garages are pictured by comic artists to feel, that they are being vacuum-cleaned out of next week's salary by a professional mechanic, whose time and skill are worth money.

Candee's place is big and clean and white. It is run on the principle of a cafeteria—he supplies the tools and the space—the patron helps himself. He also keeps an expert mechanic on hand to give toiling patrons free professional advice when they get "stuck." On the front of the shop is



Each Customer Has Use of a Numbered Stall—At the Rental Counter Record Is Kept of Every Tool Used.

man drove into the shop with his wife. She fairly scintillated with diamonds. He climbed into a pair of overalls, crawled under his car and diagnosed the trouble. Then he performed the necessary operations to restore his car to health; and they drove merrily on their way.

Mr. Candee's announcement gives all the information as to the facilities his shop affords car owners together with the charges for the use of tools and equipment. He is a great believer in letting people know as is indicated by the illustrations.

CANDEE'S

Fix It Yo'self Shop

1941 S. Main St., Los Angeles

Bench room, 10 cents an hour; drill press and power saw, 25 cents; lathe, 75 cents; automobile space, 25 cents per hour, rates by the day.

Automobile space includes: Bench, vise and emery wheel. Tools, 5 cents an hour and up.

Skilled mechanics to help you out, \$1.50 per hour.

Wash and Oil It Yourself!

Best and Quickest system known—Compressed air, hot and cold water.

Wash rack, 50 cents an hour.

Open until 11 p. m.

Candee's Announcement Gives the Car Owner Complete Information on Services and Rates.

Chicago Show Breaks "Buyers' Strike"

The "Buying Spirit" Makes Its Appearance at the Annual Chicago Automobile Show—Attendance Larger Than at New York Show and Much More Than Last Year—Many Cars Sold and Many Prospective Buyers Listed

The 21st national automobile show held in Chicago early this month, came up to all expectations and predictions that had been made. The attendance was large—much more than last year—many cars were sold according to the reports of dealers—and last but not least, an excellent list of prospects was obtained.

Visitors to the show were not there to satisfy mere curiosity—they came for the definite purpose of seeing and obtaining information about certain cars and accessories—and they freely gave their names and addresses.

Just before the close of the show on Saturday, February 5, Samuel A. Miles, general manager of the show, issued the following statement:

"At 9 o'clock Friday night the attendance at the automobile show passed the total for the seven days of 1920. Day by day this year the attendance exceeded any previous year. On no day has the increase over former years been under 11 per cent. On the opening day the increase was 20 per cent. On Wednesday the increase was 23 per cent.

The attendance of dealers was normal.

It must be admitted that the automotive industry had some misgivings and anxiety which were far from being relieved by the not very serious but indisputable decrease in attendance on the opening day of the New York show, but fortunately this has been overcome by the increase in attendance in Chicago.

Much has been said during the show about a possible shortage of cars. It

is not unlikely that this condition will shortly come about, not because of abnormal demand which we do not anticipate, but because manufacturers cannot quickly recover from a period of extreme conservatism, nor obtain material hurriedly necessary to a large output.

They anticipate increased, but not abnormal business, based upon exactly the same conditions as will affect the general business of the country, and will govern themselves accordingly."

The large "smart set" attendance was responsible for the big number of sales made, according to Mr. Miles, and their cars will be seen this spring on country roads in California, Florida and the Carolinas.

There was another class of buyers at the show. Among the visitors were many dealers from the Southwest, especially from Texas, where the big oil gushers have created millions of dollars in new wealth. The people down there don't know what hard times are. They are all in the market for cars. The good roads movement is also getting a big play in Texas.

Men who went to the Chicago show full of pessimism, had not been there long before they became imbued with optimism—the real genuine kind that sticks. They became convinced that people have begun to buy again, not recklessly or extravagantly, as they did in the days of inflated values, but steadily and intelligently.

Not only were the aisles and exhibits on the main floors in the Coliseum and First Regiment Armory thronged with visitors but the balconies

of both buildings and the basement of the Coliseum where accessories and garage equipment were displayed, likewise attracted large numbers. The interest in these exhibits was no less than in the car exhibits and those exhibiting received much encouragement as to future business.

While cars with the conservative colors of past years were given prominent places, one was impressed with the varieties of striking colors in which some of the cars were finished. The cars showed greater care in finish and in the details of manufacturing—in other words, they looked as if they were built on a quality rather than on a quantity basis.

Cars having the four-cylinder type of engines were more in evidence than cars equipped with six, eight and twelve-cylinder engines. The chassis designs appeared to have been simplified in the direction of eliminating sources of noise and rattle, and also to make them more accessible.

The trend of the mechanisms of the cars is apparently towards simplicity and the elimination of trouble-breeding parts, all of which makes the maintenance and repair much easier and, correspondingly, the car more popular.

While it is not expected that there will be any great buying boom such as has been experienced in the past four years, automobile men are confident that there will be a good business done this year—its amount depending upon the efforts which are put forth by the sales organizations. "Real effort is always rewarded."

Who Sells Accessories in Your Town?

Will Mail-Order Houses Get This Profitable Business? Local Public Will Respond to Right Sort of Advertising—Don't Waste Time Kicking Because People Buy by Mail—Show Them the Advantage of Buying from You

By Frank Farrington

Who is going to sell all the automobile accessories that will be bought in your vicinity during the coming season? Will most of that sort of thing be bought right in town, or will the greater part of the purchases come from the mail-order houses?

Are you going after this business and make every effort to see that you get your share of it? Or are you going to sit back and complain that people buy from the catalog houses just out of pure cussedness and that there is no use in trying to make them see the advantage of buying at home? I have heard garagemen and dealers before now proclaim that the local public has no appreciation of what the home business men do for the community; that they expect you to support the town and its institutions with your money while they send their money away for everything for the automobile that can be bought by mail.

It is perfect foolishness to claim that automobile owners buy by mail just to be mean. And it is a waste of time to kick about catalog competition and to try to tell people they must buy from you just because you are a local merchant and a taxpayer in the old home town. Whatever men ought to do, they do as they please.

Whether people ought to buy at home or not is beside the question. The fact is that *they will buy where they want to buy*—where they think they can buy to the best advantage. That is human nature. Do you and your family never send out of town or motor elsewhere for goods in order to get something a little different or a little cheaper? I don't suppose there ever was a man who did all his buying in his own town.

It does not matter much what the ethics of the situation are. The public will be likely to buy mainly of the people who ask most persistently and efficiently for the business. The thing to do is to keep asking. That is what the catalog house does. It is that that gets it its business. Whoever goes after the business and keeps going will get it in the end.

The mail-order people are after the business in automobile accessories in your territory. They have been busy mailing out their catalogs while you have been thinking it was too early to make any great effort for the spring business. It is safe to say that if you come along in late April or May with advertising for the accessory trade, you may find it difficult to offset results produced by the well-planned campaigns of the mail-order houses.

You certainly will find that many people have bought early, and you

It Can Be Done.

Your business can be made an all-the-year-round business if you will sell yourself the "BIG IDEA" and STICK to it. Make an honest effort to sell one WINTER necessity to each of the next TEN motorists who call. You will be surprised at the results—"Only Live Fish can swim up stream." Also, only going cars can keep business coming. Buy and sell winter conveniences and necessities.—H. M. D.

have thus lost your chance to get their money. It is old advice to fight fire with fire, but the man who gave it did not have in mind fighting a prairie fire with a tallow candle. Get your backfire advertising under way early—and make it big enough to amount to something.

Unless you are aggressive and watchful early, you will miss any chance at the first business. The man who does not keep up a stiff advertising all the time, who shuts down on his publicity all winter, and waits in the spring until the demand has begun before he gets under way, is likely to miss much of the best business on accessories.

The time to advertise accessories is before people have made up their minds to buy, or what to buy. You want your advertising to help them to decide what kind to buy and where to buy it.

It is not successful advertising

policy merely to run the kind of an announcement that will serve to tell people where they can get a certain kind of pump or jack or vulcanizer, if they have considered well and have decided to buy that kind. You want your advertising to make them want something of that sort, and then to make them believe that yours is the best of the kind.

The early bird catches the worm. Get your spring advertising going early. It is not too early if you begin it right now. At all events, wait no longer.

The only possible advantage the mail-order house offers to buyers of accessories is the price advantage. Even if it cannot sell cheaper, it may make people think it does, because it tells them its price is low and it always quotes the price on everything. You have all the other advantages, even when your price is higher. You can make immediate delivery without delay. There are no transportation charges in buying from you. There are no losses to be settled by claims on the transportation company, no adjustments to be made by mail, no orders to be written out, no buying "unsight and unseen," no chances of breakage. You put the goods right into the customer's hands, or install them in his car, all in operating order with full instructions how to use.

The catalog house cannot do that. You give a service that is worth money, and people are willing to pay you more on that account—but you must make your advertising see the service you render.

Advertising will enable you to overcome differences in price by making all your advantages obvious. You can show how it is better to buy from you because you offer service. There are other things than first cost, you know, to be considered in buying most automobile accessories. Many people forget this and it is up to your advertising to make them remember it. Advertise your advantages and the advantages of what you have to offer. Base your appeal more on a

quality and service basis than on price.

Bear on hard on the advantages of buying from the local garageman who is right there on the ground with his personal guarantee and willingness to adjust matters and his ability to supply parts quickly when needed and to make repairs while you wait.

You only irritate people when you advertise like this:

Buy At Home!

Who supports local institutions? The home dealer. Who pays the taxes that keep up our schools and churches and public utilities? The local business man.

Why send your money away to mail-order houses for cheap stuff when you can get good goods from us? Why not be patriotic and buy at home?

Advertise what you have to sell in the way of accessories and service—and advertise them well. Don't waste your advertising space preaching at the people, telling them what they ought to do. Make them see the ad-

their goods. You can use folders, booklets, cards, outside signs, fence signs, display helps—and such things cost you little or nothing to use. They help you to connect your garage, and what you sell, with the big advertising done by the manufacturers. They make the national advertising count for your business.

The mail-order houses are after the business on accessories. The fact that you have all the advantage on such lines except, perhaps, the price, counts for you if you make the fact known. Don't fail to show the public what your advantages are. Business in any line goes to those who go after it, whether mail-order houses or local garages. It is up to you whether you get the season's business on your lines or not.

London Motor Show Gives Light on British Trade Conditions.

The recent London automobile show, Fourth International Commercial Motor Exhibition, was well received, according to reports of the London Times. And although the re-

Cities Change—Advertise If You Want Folks to Know You

As a city grows, the percentage of persons who have always lived there becomes smaller and smaller. The prosperous merchant whose egotism might make him say, "Why everybody knows us—they have known us for 40 years," should think about this constant change in a city's population.

People come and go. Even those who stay, have their own feelings to think about. They are not going to carry the name of the great business house long in their minds unless they are reminded of it now and then.

When a business man gets the idea into his head that his concern is too well known to need any further advertising, he should take a look at the churches. Nearly every successful church, at great expense, maintains a steeple.

Why the steeple? Because it is sort of a trade mark—an accepted form of outdoor advertising. You can't look at a church without knowing what it is. Everybody knows that the church is there, and what it is there for, but it keeps right on with its open air advertising. And moreover, it rings its bells every Sunday.—Nation's Business.

small and the public demand apparently insatiable. Prices ruled high; in fact, the previous exhibition was dominated by the extremely high-priced, luxurious car.

A different situation confronted this motor show, for conditions were reversed. The majority of established manufacturers had achieved considerable outputs, but, unfortunately, so far as prices are concerned, this fact had been offset by further rises in the cost of labor and materials. Thus prices, with few exceptions, had not dropped far below their top level. Meanwhile, much of the accumulated demand had been filled, and the combination of high taxation, with somewhat general trade depression, militated against the placing of new orders.

In view of the increasing cost of fuel and the signs of a possible shortage pending the production of petrol alternatives on a large scale, there was naturally noticeable a tendency toward the production of a comparatively light chassis marketed at a fairly moderate cost, but aiming particularly at economy subsequently in operation.

Improving Your Car.

You can do many things to make your car more useful, more economical to operate, more attractive in appearance, more comfortable to ride in.

You will always find us ready to show you the best and the newest things in accessories—and you can buy from us as cheaply as from anyone.

Remember that when you get a searchlight, shock absorbers, an improved carbureter, mirror, a new battery, or other appurtenances, the price we quote you means in place on your car in perfect condition, ready for use.

When you buy such things from a catalog, you have to install them yourself, or pay for having it done. You have to wait sometimes to get what you order. You may receive your purchase in bad condition. There may be claims to be adjusted at long distance.

You want new accessories for use just as soon as you have decided to buy them. Come to us and get immediate service at a minimum price.

Have you seen those new Eezylift jacks we are selling for \$2.25 each this month? Every woman driver ought to have one of these anyway. They make tire changes easy for them.

See our big window display of accessories just put in.

Jackson's Central Garage.

In Advertising Accessories, Tell of the Advantages of Buying Them From You.

advantages of buying from you, and they will give you their patronage. Tell them what they ought to do and they will resent your advice and take the position that they can do as they please. A better type of advertisement to use is shown on this page.

Ask the manufacturers of the accessories you sell to supply your garage with advertising matter for

sults obtained in actual orders were not so satisfying, yet the value of the exhibition from an educational standpoint and the outlook for future business were considered ample to justify its promoters for their outlay.

The circumstances under which the exhibition was held were very different from those prevailing 12 months before. Then the output of cars was

Think Before You Cancel Contracts

Do You Know Law on Contracts?—Knowledge of Law Governing Contracts Is Important at Present Time—Intent of Law Is to Bring About the Performance of Legally-made Contract—How These Contracts Are Discharged

By Chesla C. Sherlock

The widespread cancellation of contracts among business men at the present time makes the subject of the cancellation of contracts of extreme interest and importance to everyone. There seems to be a popular misconception as to when and how a contract may be discharged.

In the first place, the whole intent and purpose of the machinery organized by the law of contracts is to bring about performance of a legally consummated contract. The law cannot place a premium upon any other purpose, unless it is to be a mere travesty on justice and well-ordered commercial relations. Men are supposed to intend the reasonable consequences of their acts; they are supposed to intend that their contracts shall be carried out, otherwise they would not have entered into them in the first instance.

The mere fact that performance of a contract will entail loss upon one party, even ruin, is not a bar to such performance if its object was reasonable and capable of execution. To save one of the parties from loss, the law would in the very nature of things be called upon to impose that loss upon the other party. The law is never a respecter of persons and can not be if ultimate justice is to be done in all cases.

A contract, once legally made, can be discharged only in the following ways: By agreement of the parties, by performance, by breach, by impossibility of performance, or by operation of law.

The parties to a contract may mutually agree to rescind or cancel the agreement, provided there is a consideration to such cancellation as where there is a mutual advantage to be gained from such rescission. Contracts are cancelled in this manner every day that business is done.

One authority says: "The general rule is, that a contract must be discharged in the same form in which it is made. A contract under seal can only be discharged by agreement; if that agreement is also under seal, a contract entered into by parol (word

of mouth) may be discharged by parol (agreement)."

Contracts are, of course, discharged by performance. Payment in money is the usual mode of discharge by performance, but if the contract specifies any other mode of performance it is valid. A mere tender of payment, or of performance, may discharge the contract, as where the vendor of an article does all that he agreed in regard to delivery, but if the vendee refuses to accept the article, the vendor is dis-

Anger because someone has done work wrong does not help matters any. It does not undo the mistake, or help make the erring one not less likely to repeat the error than would a careful showing of what is wrong, and the proper method. Your own energy could be far more profitably spent than in a fit of temper.
—Orison Swett Marden.

charged from the agreement and may sue for breach of the contract or successfully defend himself if he is sued.

Breach of the contract by one party not only operates to discharge the other party from performing his share of the agreement, but it also gives the other party a right of action against the first party, either for damages or to compel performance by an action for specific performance.

The right of an action arising from a breach of the original contract is discharged only in the following manner: Either by consent of the parties, by the judgment of a court of competent jurisdiction, or by lapse of time, as where the statute of limitations extinguishes the right.

As a rule, impossibility of performance arising subsequent to the agreement will not operate to discharge the contract of a party who has made an unconditional promise to do a thing. But there are a number of exceptions to this rule.

For instance, if the impossibility of performance arises from a change in the law, the promisor will be absolved from liability. If the continued specific existence of a certain thing is neces-

sary to the performance of the contract, the failure of that thing, through no fault of either party, will discharge the contract as being impossible of performance. If the subject of the contract be personal services, it will be discharged by the death or incapacity of the promisor.

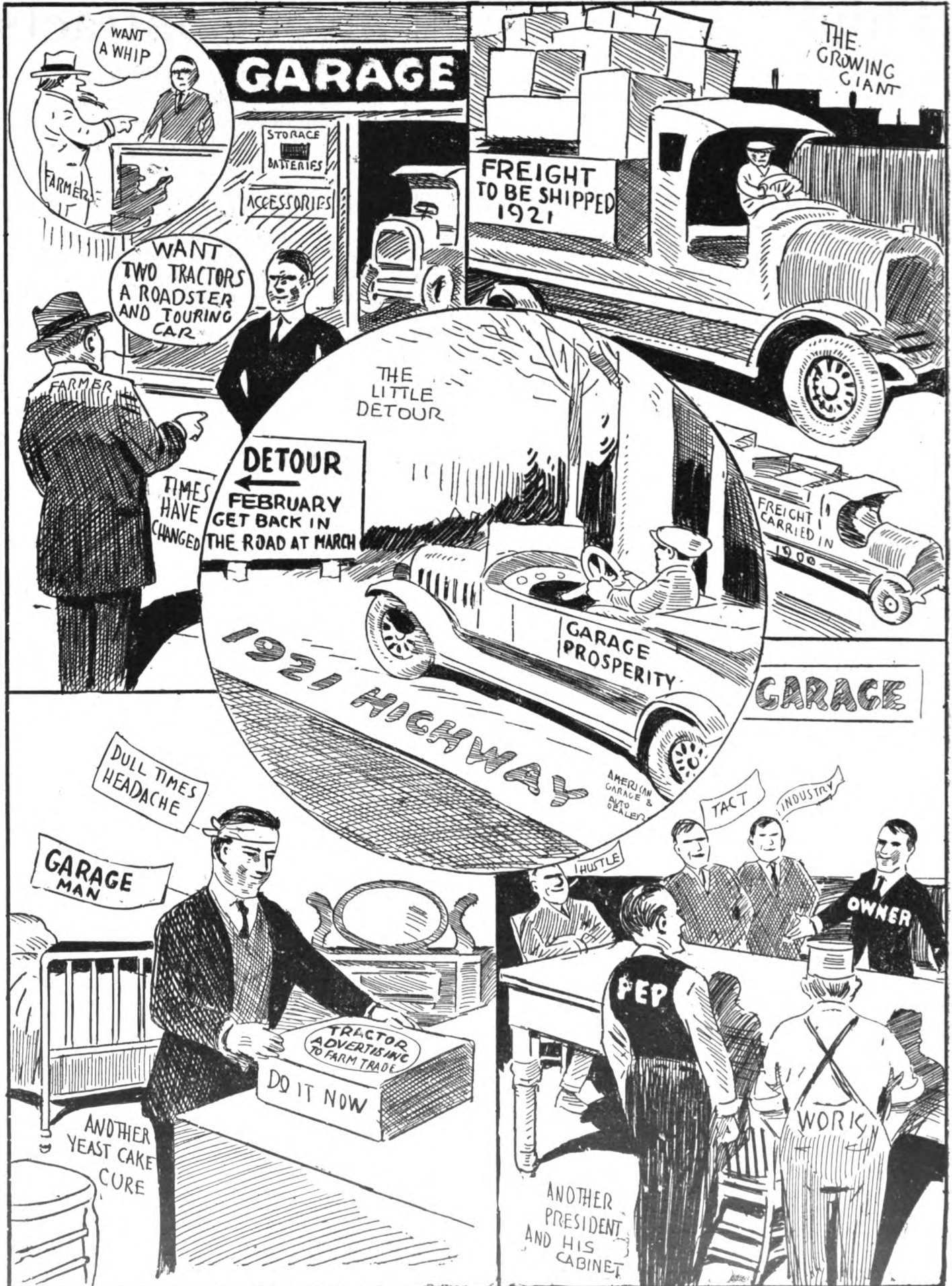
Contracts may be discharged by operation of law. For instance, a judgment in bankruptcy may operate to discharge all obligations and debts of a debtor, or the contract may be merged into a greater obligation as in a judgment or a deed, or it may be discharged by the spoilation or alteration of a deed or written instrument. Such alteration, however, must be material and have a different legal effect than that contemplated by the parties at the time the agreement was originally entered into.

In the absence of some measure of fraud in the inception of the agreement there is no authority at law for the cancellation of a contract by the mere refusal of one party to perform, and by "cancellation" we refer to the successful termination of a contract without having to answer in damages for the breach thereof.

Contracts often fail in court because they have not been properly formulated and expressed. A mutual mistake of fact as to a material object in the contract will avoid the agreement, but a mistake as to law will not render the contract void. Ignorance of the law is no defense for either party.

The vast majority of contracts which are being "cancelled," now that a declining market is upon us, are perfectly legal and binding, and the men who are seeking to escape the inevitable through avoidance of their agreements are simply beating their heads against a stone wall.

Sometime they will be called into court and they will have to stand good the damage done, as well as pay court costs and attorney's fees. There is no profit in seeking to avoid contracts legally executed and made. Performance is the cheapest in the long run.



Accounting:

One of a Series of Articles on Garage Accounting, Which Includes Garage Records and Cost Systems—If Readers Have Any Questions Regarding Accounting Methods We Shall Be Glad to Receive and Answer Them in This Department—The Chart of Accounts

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting

Bookkeeping is the recording of business transactions as they occur and when they occur, and the grouping of these transactions to show the effect they have collectively on one's present worth.

Properly posted, properly summarized and properly interpreted, one's books or records are capable of furnishing more information than most garage owners realize. It is said that the Chinese hire a doctor to keep them well, pay him so long as he keeps them well, and refuse payment during sickness. No one can criticize the wisdom of this policy. One's accounting records take the place of the Chinese doctor, except that the fee demanded is less heavy.

A proper bookkeeping system should furnish a guide in the conduct of the owner's business, point the way to better business policies and become the greatest single factor in his business and his success. The accounts are his records, his books of reference in all matters relative to the results of his business. When involved in a dispute, they are his evidence. His books are his guide in the supervision of his business and the work of his employes, his protection against continued fraud, theft, and loss by error.

In your dealings with others than your clients, and very often with them, your credit must be established. It is always of importance for a garage owner to know exactly where he stands, and in his dealings with his bank and his creditors, it is absolutely necessary that this information should be accurate and readily available. These are self-evident, vital considerations and because they are vital, mistakes may lead to disaster.

A bookkeeping system is necessary in the garage business in order: (a) To furnish a statement of operations; (b) To furnish a financial statement; (c) To furnish a statement of costs; (d) To protect against losses by fraud or error; (e) To establish credit rating; and (f) To furnish a guide in organization and management.

It behooves every business man then to have some system of bookkeeping

which will furnish him with information that he can be reasonably sure is accurate. The business man does not need to be an expert accountant to know whether records made for him are satisfactory and useful, but if he does not know what his records ought to be and what they tell him, he may be at the mercy of the honest but stupid bookkeeper.

Good accounting methods form is a road broad enough for anyone to travel on. The ditches on each side are—too little system and too much red tape. One is just as bad as the other.

Bookkeeping systems should be no more complicated than the business they take care of. The garage and automotive sales business is not a complicated business. If one has the ability to operate a business successfully, he certainly has the ability to understand the bookkeeping that should go with his business. The simplest system is always the best system and in this and succeeding issues it will be our aim to outline the simplest system of records for the average garage owner.

The system we will outline involves double entry bookkeeping. In double entry bookkeeping, as the name implies, a double entry or posting is made for each transaction. For every debit amount posted on the records, a corresponding credit amount must be posted. The general rule for debiting and crediting is to debit the account receiving value and credit the account giving value. Debit what gets; credit what gives.

Double entry is most commonly used because it provides more readily information vital in the conduct of the business.

In single entry, but one side of the transaction is shown. Single entry is concerned for the most part with personal accounts, while double entry records the effect of business transactions on both personal and impersonal accounts. A personal account is an account with a person or persons. In cash and merchandise, personal accounts are represented by the custodians—cashier and stockkeeper.

Single entry bookkeeping deals in personal accounts, not business accounts. It necessitates a physical inventory to obtain a financial statement. It does not afford an internal check for accuracy. It is valueless when needed most, as it does not furnish business information on the moment. It cannot furnish an operating statement and is lacking in most essentials of good bookkeeping.

If books are a necessary evil, single entry will do. If books are an indispensable necessity, they are used to furnish vital information on the shortest notice. Single entry will not furnish this information without involving much labor.

In the matter of books used for keeping the accounts, it is the author's opinion that there is no choice for the garage owner. Loose leaf is the trend of the times. We do not know of an argument for bound books in this business. They certainly are not as elastic, convenient or economical as the loose leaf records. The more we can centralize our information, the fewer places we have to look for it, and the better our system will be. Contrary to the average conception, with the same safeguards, loose-leaf is just as safe as bound-book records.

Accounts kept in books may be classified: (a) Financial and economical. (b) General ledger and individual or subsidiary ledger. (c) Financial statement and operating statement.

General accounting is that part of bookkeeping that deals with general accounts including balance sheet and profit and loss accounts. Cost accounting is that part of bookkeeping dealing with the detail cost accounts. It furnishes a detailed analysis of the costs of operation.

The garage owner's system should include cost accounting, for knowledge of costs in a business employing labor is vital in the successful conduct of that business. As the garageman's sales are for the most part service, it is vitally necessary for him to know his costs. You must know your costs to know whether you are operating efficiently and economically.

Accounts are the basis of any book-

keeping system. The success with which they show the results of business transactions govern their bookkeeping value. Accounts are the containers into which are poured the records of results and the effects of transactions.

These reservoirs of information must be so constructed and arranged as to offer the maximum information with the minimum effort. If a bookkeeping system is to serve the purpose for which it is installed, the classification of the transactions and terms applied to them form the important features of the system. Incorrect or indefinite classification of accounts will spoil entirely an otherwise good system.

The Interstate Commerce Commission requires certain information

keeping system is an analysis of the business involved and the purposes to be accomplished. We must first of all classify all income as to its source, and all expenses or costs with reference to the incomes of which they are costs.

This chart must be sufficiently detailed to give a clear record of each business activity. The question as to the amount of detail must be settled by the individual garage owner. However, to establish a uniform bookkeeping system a certain amount of detail must be insisted upon.

What the average business man wants to know is his "present worth" and "result of operations." With these points in view, his accounts are charted to present a balance sheet or statement of assets and liabilities and

be carried beyond that point where the additional detail information obtained is not worth the additional effort or expense involved in obtaining it.

Quiz Questions on Garage Accounting.

1. Define bookkeeping. What two kinds of bookkeeping are in use today? Which is the most commonly used and why?
2. With what accounts does single entry bookkeeping deal?
3. How is the idea of a personal account represented in such accounts as cash, and merchandise?
4. Enumerate the disadvantages of single entry bookkeeping.
5. How may the accounts kept in the books be classified? State the general rules of debiting and crediting.
6. Why is a bookkeeping system necessary in the garage business? Give at least five reasons.
7. What is meant by the term "general accounting?" What is meant by the term "cost accounting?"
8. Why should the garage owner's system include cost accounts?
9. What is meant by classification of accounts? By the term "chart of accounts?"
10. Illustrate the value of detailed classification of accounts.
11. Give subdivisions of the asset accounts; the liability accounts.
12. Name ten commodities included in the account "merchandise" in the garage business.

U. S. Post Office Is More Than 50 Per Cent Motorized.

More automobiles are speeding the United States mails than ever before, according to the annual report of Postmaster General Burleson for 1920.

More than 50 per cent of the vehicles in the postal service are automobiles.

Government-owned motor vehicle service has been established in 163 cities.

Eight hundred and ninety-three rural routes are using cars or trucks.

King Albert of Belgium Possesses Complete Camping Trailer

An elaborate camping trailer, designed for hunting in Africa, is owned by King Albert of Belgium. The trailer is drawn by the king's handsome, big touring car and contains a kitchen, bathroom and combination lounging and dining room.

Assets:	Liabilities:
Bank.	Notes payable.
Cash.	Accounts payable.
Petty cash.	Notes receivable discounted.
Liberty bonds.	Deposits payable.
Postage stamps.	Pay roll.
War saving stamps.	Accrued payables.
Notes receivable—less allowance for doubtful.	For a corporation:
Accounts receivable—less allowance for doubtful.	Capital stock.
Deposits receivable.	Surplus.
Merchandise—less allowance of depreciation.	Profit and loss.
Unfinished jobs.	For an individual or partnership:
Shop equipment—less allowance of depreciation.	Investment.
Office equipment—less allowance of depreciation.	Undivided profits.
Buildings and real estate—less allowance of depreciation.	Profit and loss.
Investments.	
Deferred charges to expense.	
Income:	Expenses:
Sales.	Service.
Cost of sales.	Sales.
Other income.	General or administration.
Additions to Income:	Deductions from Income:
Interest earned.	Interest allowed.
Discount earned.	Discount allowed.

Chart of Accounts Gives the "Present Worth" and "Results of Operations."

about the operations and financial condition of our railroads. To obtain this information the commission was forced to establish what is known as the standard classification of accounts for railroads. It issued a manual listing the accounts and detailing every item to be charged or credited to them. The same plan was carried out with other public utilities. The same care, study and thoroughness is necessary in the devising of a bookkeeping system for any business.

The first step in devising a book-

keeping system is an analysis of the business involved and the purposes to be accomplished.

With these explanatory comments we present the accompanying tentative chart of accounts.

The asset and liability accounts are sometimes termed the "financial accounts" while the income and expense accounts are termed the "economical accounts."

The classification presented here is not as elaborate as that suggested by some of the larger automotive concerns but it must be remembered that classification in bookkeeping must not

If It Aint Rite Give Munny Back

Persy Haits to Give Munny Back but the Boss Sez Make It Right—How's a Feller Going to Get Ennywhere if He Can't Lern from Fokes That Kno More Than He Does?—He Ought to Be Lissening to What the Rest Hav to Say

By Frank Farrington

Deer Pete:

Sum days I wish I had a good soft job in a drug store like you have where all you haf to do is to wash a few bottels and stick a cork in em and then go home to dinner. Youd ought to be in a garage once. I got your letter telling all about things in old Pinkvill and what a good place youv got to work. And the mane reeson seems to be becaws there issent much going on so you dont hav much to do.

Ide rather be here in Pike Citty where there is sum chance to get rich even if I do haf to work harder. Seems to me the place to get bizness is where it is, not where it aint.

I dont kno how it wood seem to get munny without working hard for it. Now theres Dazie, she dont work hard enuf to keep up her appetight for chick-in' feed and she gets her munny just the same. She does work pretty hard tho keeping her complexshun so it wont rub off on ennyboddy.

Say Pete, does ennyboddy ever cum into your store and want their munny back? Ile bet they do when you sell em sum bum coff syrup that makes em sicker insted of curing em. Well we figger on giving fokes back their munny whenever they get ennything here that aint rite. Persy haits to do it though. He thinks that when you get a mans munny youv got it to keep and if he dont like he can lump it.

The other day a man rolled up in frunt and Persy went out and he had a big booming voice and he sed to Persy, "Yung feller I got a set of spark plugs here last week and I paid nine bux for em and when I got home one of em had the porsellain all crackt to hellengone. Sumboddyd

droppt it sumtime and it was no good."

"Yes," sed Persy. "Is that so? Its too bad."

"Its too dam bad," sed the man and Ile bet fokes cood hear him acrost the street. I saw one woman look over that way. Then the man askt, "What're you going to do about it?"

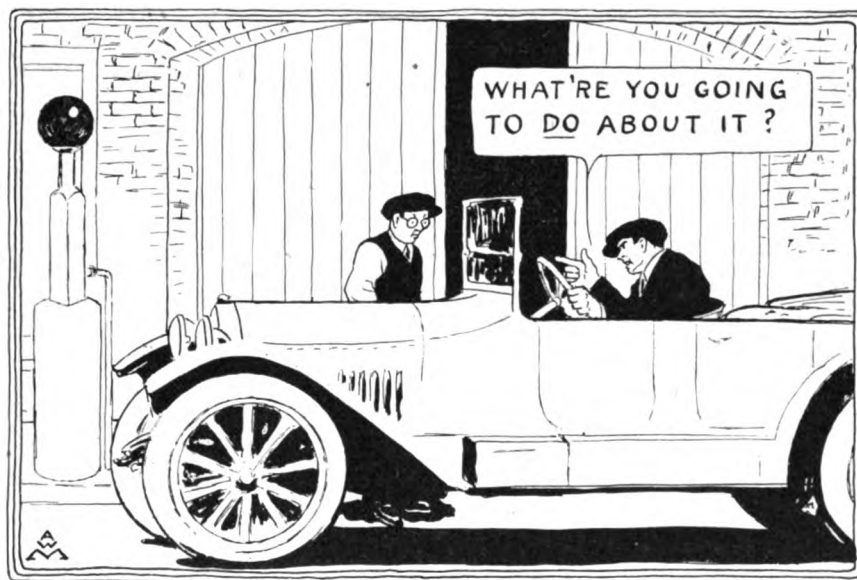
"Why," said Persy, "Ide recom-

on top of the fire and send you to hel if you aint to grene to burn." Pete, I woodent dast to rite enny more of the things he sed.

Then I herd the offis dore shut and the boss shut Dazie in and shut himself out and he cum to the man and he sed, "Good morning sir. I am the proprietor of this garaje and I am sorry the spark plugs were not all of

them in perfect condition. We are always reddy to ad-just enny complaint and if you will return the broken one we will be glad to give you one that is all rite. You are entitled to six good plugs and we want you to have them."

The man kept trying to say something and so did Persy but the boss diddent giv em a chance. He sed, "Not a word of thanks necessary. We are glad to do this. Its our regguler rool and this



We Figger on Giving Fokes Back Their Munny Whenever They Get Ennything Here That Aint Rite. Persy Haits to Do It Though.

mend that you buy anuther and be careful not to drop this one on the way home so it wont get the porsellain busted."

Say, it wood make ennyboddy mad just the fishie way Persie sed it. I cood see that man getting madder and madder and I expected the boss to cum out of the offis enny minnit.

Then that man began to rore and swear and I gess he must have bin a mule skinner in the army to get such a lot of langwidge that a lady haddent ought to listen to.

He wound up saying, "Youre a cheet and I paid for good spark plugs and one was busted and I carried em home as careful as ennyboddy cood. Im going to have a good one for that busted one or Ile tear the hole insides of this garaje out and pile it in the street and set fire to it and thro you

man knoze it only heez such a nattural born titewad that he hates to see me giv up a cent without I pinch it six times first. Persy get another spark plug of the kind this gentleman wants."

Well that man quieted down and he went off feeling all rite with his new spark plug and the boss told Persy heed ought to of let him be put on the fire like the man sed and sent to hell and he told him heed giv him another chance to see if he cood get enuf branes into his hed for his mothers sake. And thats how I found out that Persys mother is the bosses sister and thats the only reason we hav that guy wisht on us. I gess the boss is tired enuf of the job and wont stand for menny more of Persys fool ackts.

I askt Bob how the boss cood afford to give a man another spark plug or

give fokes back their munny when they kick like they sumtimes do about sum oil or sumthing.

Bob sed he coodent afford not to. He sed, "If by paying the price of a spark plug we can make a customer think weer good fellows and make him stick to this garaje when we mite of lost him, its a good investment becaws it wood cost more than that to get a new customer and get him plugging for us. Its only once in a while that enny fire eeter like that guy cums along. Its more often they dont kick when weed rather they wood than to hav em going around thinking weev beet em when we diddent hav enny ideeah of it ourselves."

So I gess Pete theres times when its good bisness to give a man his munny back or sumthing and if he keeps on cumming to us weel get our munny back agen from him after a while. If he never cums back and went around kicking about our garaje, then where wood we be?

But I dont suppose you can teech that Persy ennything. If he wassent so big the sqwirrels wood of carried him off long ago. They dont ennything sink into his brane if heez got one. He thinks its all just jaw hash and that noboddy knoze as much as he does.

When a feller cant lern ennything from what heez told by fokes that kno more than he does, hows he going to get ennywhere? If heez so stuck on his own ideeahs that heez shure even the boss is rong, gee, heez going to be a ded one all his life.

I red in the Garaje and Auto Dealer paper the other day that its an awful slo way of getting along just finding everything out by experiece and havving to make a lot of mistakes before you kno the rong or the rite way to do ennything. It sed that a feller ought to be lissening to what the rest hav to say and reeding about it in books and automobeel papers. Then he cood profit by the other fellers mistakes and not haf to make em all himself.

But Persy he cant profit by ennything. Heez got to have it nockt into his hed and that woodent be so bad if you cood nock ennything in. Its like trying to drive a nale into a hardwood plank. Heez like an old feller sed in the offis the other day that there wont ennything stay in a mans hed after heez seventy but lice, only Persy aint seventy yet and I gess he never will be becaws sumboddy will put an end to

his yung life if he dont get wise and lern sumthing.

I got your letter Pete saying you got a raze becaws you bin there a year. Gee is that the only reeson the boss cood find for razing you? That aint much of a reeson but I gess mebbly there was sum other reeson. Mebbly youv lerned sumthing in a year. If you havvent your worse than Persy.

Yours til the boogel blows,

BILL.

Railroads Get Large Revenue From Automotive Industry.

Railroads are well up in the long list of industries that profit from activity in the motor car trade. Both in its own production and through operations incidental to its growth the

DEVELOPMENT AND SUCCESS.

The constituent parts of the human being—the same kind of mentality which made possible the greatest achievements of the greatest men the world has ever known—are possessed in every degree by every normal man, the development of which makes for success. — Edmund Ward.

automobile industry has been a great boon to the long haul transportation lines. To build automobiles and motor trucks requires heavy materials, steel, wood, metals, fuel, tires—thousands of tons annually. It is on such activities that our railroads thrive.

Although the amount of freight paid by the industry to the railroads can not be stated with accuracy owing to the diversified and tremendous amount of shipping to and from plants engaged in the manufacture of engines, wheels, bodies, tires, and other parts and materials, some indication of the industry as a supporting factor of the rail lines may be had from the National Automobile Chamber of Commerce report, in connection with shipments of finished automobiles and trucks from the factories.

Based on the number of carload shipments of completely assembled machines recorded in 1919 and allotting them to the several territories in about the proportion of registration, the estimate indicates a total freight bill of \$56,000,000.

In addition to this, it is believed that not less than \$10,000,000 was paid on carload shipments of parts forwarded from the main automobile plants to branch plants for assembling, which would increase the total to \$66,000,-

000. Applying the increased freight rates recently authorized by the Interstate Commerce Commission, this sum, it is estimated, will be raised \$22,000,000 on an equal volume of shipments during the ensuing year, or a total of \$88,000,000.

This figure, says the bulletin, should exceed \$100,000,000 with adequate car supply because in 1919, 130,000 motor vehicles were delivered to buyers over the highways under their own power, to points as far from the factories as 1,000 miles and over. This is equal to 40,000 carloads. But in the first nine months of 1920 so severely did the car shortage strike the motor car industry that 440,730 machines, equal to 130,000 carloads, were delivered to buyers in this manner.

Allowing 10 per cent of this quantity as nearby or local deliveries and \$100 per carload as an average freight charge on the remaining 117,000 carloads, the amount of freight revenue lost to the carriers through inability to furnish freight cars during these nine months was nearly \$12,000,000.

Shipments of finished automobiles and motor trucks from the main plants reach a volume of about 300,000 carloads per year, but according to the freight commodity statistics of the Interstate Commerce Commission this figure including, however, wheels and parts as well as shipments of motor cars from all sources, will be nearer 500,000.

Since January 1, 1920, the commission required railroads to report this as one of the principal items of traffic recorded separately. Figures for this first quarter are available and indicate 126,624 carloads. Motor cars move largely in trainload lots from the centers of large production, and loading and unloading of freight cars is accomplished with great rapidity, all of which adds to the attractiveness of this traffic from a railroad viewpoint.

The earnings shown, however, cover only the charges on finished machines and take no account of the immense tonnage in and out of the factories engaged in making tires, engines, frames, bodies and various other parts. In getting their fuel and materials, and shipping their output, these plants require thousands of freight cars each month.

The shipping by freight and express of automobile parts and other articles and accessories used by automobilists has reached a tremendous volume.

Overhaul Jobs—The Service Basis?

O'Brien's New Mechanic Did Overhauling With One Thought in Mind, "Service"—Bolts and Capscrews Re-threaded and Made Tight and Rigid Because He Had a Complete Set of Taps and Dies—Earning Value to Garages

By J. N. Bagley

Honk! Honk! Honk!

Betty Smith, the bookkeeper, wheeled her chair and pressed the electric button to her right, causing the heavy steel doors to swing open at the main entrance to Tim O'Brien's big garage. Bob Lloyd with his fur coat collar well about his head, ushered his big six-cylinder Studebaker car inside. Again Betty, at her station, placed her hand on the button and the doors swung to, shutting out the raw north wind.

"Pretty cold, isn't it, Bob?" inquired Tim as he came over to the car. "It's colder'n—Darn my cats, there go my new spectacles. That makes three pair in three weeks. Guess I'll try a pair with bows. My nose never was intended for anything to set astride it anyhow."

"That ball game at Ford Forks, in the fall of '99 fixed your nose, Bob. But, say, we sure cleaned that bunch of sprouts that day even if you did get your nose flattened. Remember it?"

"You tell 'em I remember it. Mighty well, too, Tim. That same night Kitty O'Neill was to go with me to Lowery's dance and when she saw my face, she declared I'd been fighting and she went to the dance with Fat Scroggins."

"Yes, I remember that, and by the way, Bob, that burning-in machine out in the shop is Fat Scroggins' invention."

"What the blazes is a 'burning-in machine,' Tim? That's a new one on me," returned Bob, showing interest.

"Come on into the office and get warm and I'll tell you about it. We use it for fitting bearings instead of scraping," continued Tim as he pushed a chair to Bob alongside the radiator. "We can overhaul a car in just about one-half the time since we installed that machine."

"Suppose you do it for less money then, don't you?" laughed Bob.

"Well, yes, we do and give you a much better job, too."

"Oh, yes, someone told me that you had a new mechanic, is he any good?"

"You bet your life! He's the best I ever

had and say, that boy is fast, too. He is very careful about estimating a job and when it goes out—it's right—that's all. Your car has been out about a year, why not overhaul it during this bad weather? At any rate, let us estimate the cost. I'll have that new mechanic look her over."

"Well, all right," returned Bob, "You call him out and we will see what he says."

Betty gave three pushes on the button

flat on his back with his notebook, making notes. Tim laughed.

"He does things different, Bob. Wait until he gets through. Come into the workshop and I will show you the burning-in machine that Fat Scroggins invented."

They had been back to the office but a short time when the mechanic came in, notebook in hand. He took a seat near Bob before he started to talk.

"To begin with, Mr. Lloyd, my price for overhauling your car may be somewhat higher than many mechanics might charge you—when you will get about what you pay for."

"Why should you charge more than Bender at the O. L. D. Garage?" inquired Bob.

"I give you more in an overhaul. Now, for example, Mr. Lloyd, most mechanics look over the motor, transmission, rear axle, etc., and call it overhauling the

car. My plan of overhauling differs inasmuch as I remove every loose bolt about the frame body, etc., and extend the thread until the nut will go home. On your car, Mr. Lloyd, there are 36 bolts which are so loose that I can spin them with my fingers very easily. That means, in nearly every case, that it is necessary to remove the bolt, extend the thread and replace. You can readily see that this is very necessary if the job is to be turned out with one thought in mind—'Service'."

"Would it not be better to use new bolts instead of re-threading the old ones?" inquired Bob.

"Most assuredly not, Mr. Lloyd. It is necessary to remove the old bolts, even though a new one is put in its place, and I can replace the old one with the thread extended just as quickly as I can use a new one after it has had the die run over it. Then, again, if the old bolt is used, it fits exactly, while if I were to use a new one, there is a chance that it would be necessary to substitute something just as good.

"Wait a minute, Mr. Lloyd," continued the mechanic rising to his feet. "I have

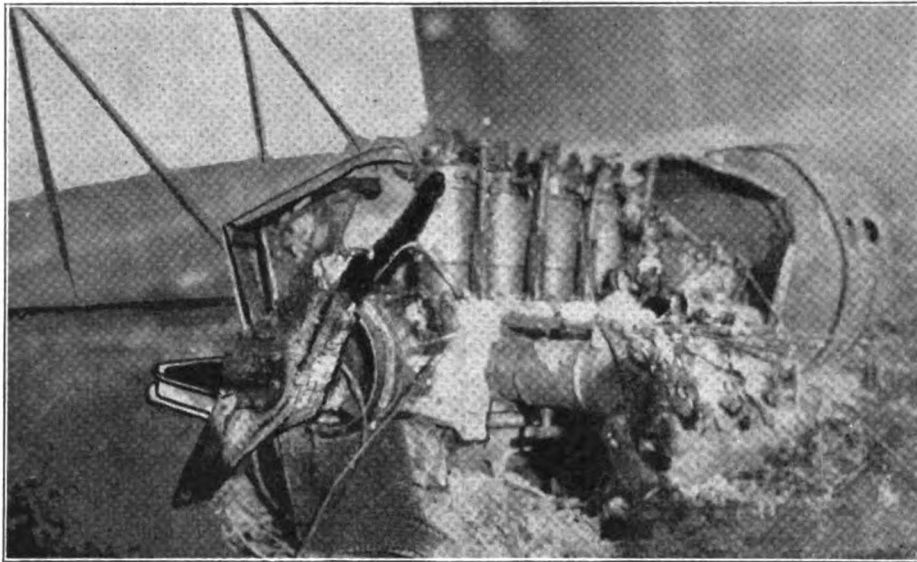


Fig. 1. An Airplane Once—Taps and Dies Used on Repairs Would Have Avoided This.

and in less than a minute the mechanic was on the job. "Mr. Ellis, this is Mr. Lloyd. Mr. Lloyd wishes you to give him figures on an overhaul job."

"Yes sir, Mr. Lloyd," came the reply, "at your service."

The telephone rang. Bob and Mr. Ellis went out to the car. Bob's interest was attracted for a minute and when he looked around, no Mr. Ellis could be seen anywhere. He stood around for two or three minutes and went back to the office to locate the mechanic.

"Well, what does he say, Bob?" inquired Tim.

"Say? Gosh, I've lost that fellow. I don't know what happened to him. He was there and when I looked again he was gone."

"Well, I can't understand that!" returned Tim with surprise. "He is not in the habit of doing anything like that. We'll see."

With that they went out to the car but all was quiet there. Bob started around the car and tripped over a pair of feet that were sticking out from under the car. He looked under and there was the mechanic

something to show you." He handed Bob a photograph, (Fig. 1).

"Here, Mr. Lloyd, is the result of something just as good—the remains of what was a perfectly good airplane of the two-passenger type."

"And how do you account for that?"

"The car had been overhauled at a certain garage only about two weeks previous to the accident. The threaded end over which this arm slipped was evidently damaged and the nut forced on with a heavy hammer, because all the threads leaned upward. The nut came off and so did the

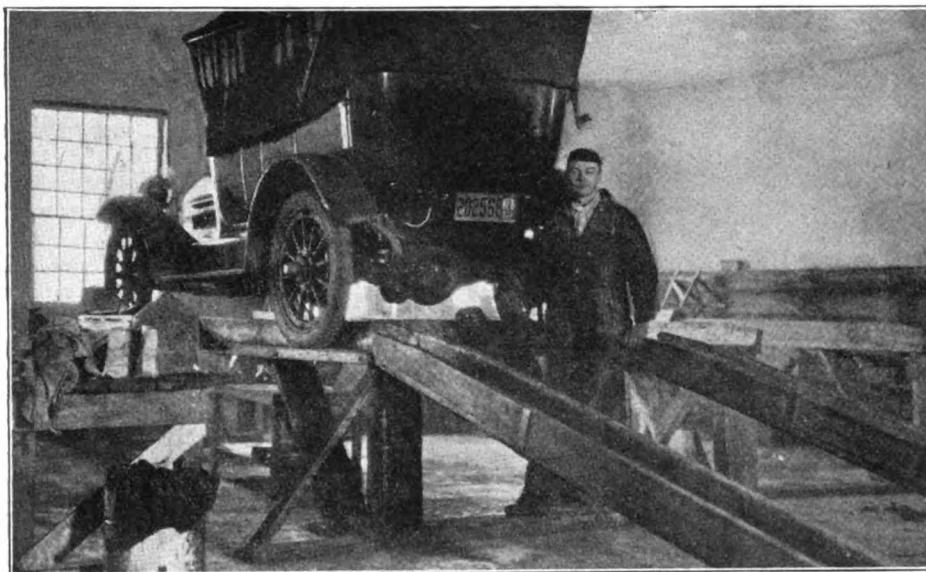


Fig. 2. Elevate Car and Remove Bolts From Under Side for Re-threading.

"It is an easy matter, Mr. Lloyd. The aviator made a forced landing on the prairie and, being close to a small village, the airplane was towed to the garage. During the time the repair was being made, the mechanic accidentally broke the bracket above the engine carrying the control rods, etc. In removing the rod that controls the advance and retard of the breaker box from the damaged casting, the threads were somewhat mutilated because of inaccessibility with tools.

"The bracket was repaired, but, when the time came to replace the control rod, the threads were damaged to such an extent that the nut could not be started. The mechanic, having no taps and dies about his shop, filed the threaded end until he could get the nut started. When the engine was started, the vibration soon loosened the half-fitted nut and the rod fell from position. Coming into contact with something about the magneto, it fired the engine out of time, setting fire to the mixture with the intake valve open. The burned gas flashed down the intake to the carbureter and the entire machine was a mass of flames in a few seconds.

"This, Mr. Lloyd, is but one instance. I might tell you of many if I had the time. You remember only a few days ago that wreck at Ox Bow Hill which cost the lives of three?"

"Well, that was a case of a similar nature to the one I have just mentioned. We examined the car closely after the wreck. The cause of that wreck was quite plain to me. The steering arm came loose from the sector, leaving the driver at the mercy of fate, and fate was against him.

arm. The car was wrecked and three of the party were killed.

"Now, Mr. Lloyd, I have the necessary taps and dies to re-thread every bolt and capscrew about your car, making it as tight and rigid as when it came from the factory. My price of overhaul is based on a job of this kind."

The mechanic had devised a plan to work under the car (Fig. 2) where all nuts and bolts can be reached without trouble. Two portable runways permit of the car being run onto the rack. The wheels are then blocked, and the runways removed and placed in an out-of-the-way position until again needed.

A small bench on castors is pushed under the car from the rear. On the bench is a small vise. The bolts are removed, re-threaded and replaced in a very short time. All spring shackle bolts are removed and the oil channels are cleaned.

The springs are taken apart and all rust polished off on the polishing wheel. Fig. 3 shows a corner of the shop where work of this sort is done. The principal tools necessary here are forge, grinder, anvil, vise, drill, etc.

"Mr. Lloyd," resumed the mechanic, as he returned from the workshop carrying a large box under his arm, "in this box I have something you are, no doubt, familiar with. This set of taps and dies you see here, I use almost as often as I use my wrenches, screw driver, etc.

"Just let me show you a single instance where this tap and die set was responsible for reclaiming a number of parts that were just as good as new—parts that were thrown into the junk pile before I came."

The mechanic left the room for a minute and brought in a bunch of front spindles. These spindles (Fig. 4) were all in a No. 1 condition except the threads had been damaged sufficiently to prevent the locking nuts being started. New spindles had been used and the old ones thrown into the corner, simply because the mechanic did not have the necessary dies for re-threading.

"Mr. Lloyd, that pile of spindles represents in the neighborhood of \$100. Some customer paid for them. Since I came here to work, with the tools you see in this box, I have re-claimed over \$350 worth of parts, and they are just as serviceable as they ever were.

"When I overhaul a car, I consider taps and dies of more importance than the wrenches, etc. Any old tools will answer for tearing down, but when it comes to building up, that cannot be done without the necessary tools, and taps and dies are included in my list of necessary tools.

"Only yesterday a traveler came into this shop with a Ford where two of the bolts holding the cylinder head had been broken off. Someone had tried digging them out with a chisel and had ruined all the threads in the block. Our competitor told him he would have to have a new block, which would cost him so much, and the labor of transferring the rest of the machinery to it amounted to something like \$125.

"He came over to our garage and laid the case before me, and he was not long in getting his car over to our place. Instead of it costing \$125, it cost him \$7.85—and he had just as good a job as he could have gotten with the new block. I removed the cylinder head and drilled the block out sufficiently to screw in a bushing, having a threaded passage to receive the regular capscrew, placed a new gasket in position, and replaced the head.

"Taps and dies did the trick—and they made us a solid customer. They saved that customer \$117.15 and gave him his car in two or three hours, against four days to a week if he had listened to the man across the street. I am not referring to these little things to boast or to knock on our competitor—I am just trying to get you to visualize this overhauling of motor cars in the right way.

"Now, here, Mr. Lloyd, is a tap and die quite a little out of the ordinary," continued the mechanic, as he produced a tap and die cutting a 1¼-inch U. S. standard thread. "I doubt if you will find another one within a radius of 25 miles. Most mechanics would not even consider adding this to a tap and die equipment, but let me tell you something—that tool has been used six times since I have been working in this garage; twice on a tractor, three times on three different road-grading machines, and once on Mack Dill's threshing machine.

"He lives 12 miles north of here. I remember when he came down with that job. His machine was standing down near the river, and all of his crew drawing their

pay while he was driving from one town to another to get the job done. I fixed him up in about 30 minutes and told him that the bill would be \$1.25 for the 30 minutes' work, for I always had to figure it was worth something to keep tools that were used but little.

"You're right, lad," said Mr. Dill as he drew out his checkbook, and then he wrote two checks, one to the proprietor for the \$1.25 and one to my order for \$10. 'That tap and die, young man, has saved me no less than \$100, if it saved me a cent,' were his exact words as he gathered his work up and hurried out of the shop to his car.

"I dare say, Mr. Lloyd, I have more taps and dies than any three garages in this country. My boss gave me \$5 more per week after I had been here a month and he saw how I did things and the tools I had to do things with. I always prefer to furnish my own tools for overhauling, for there are few owners of garages that know what the mechanics actually need along this line.

"But, getting back to your particular job—I want to do it my way or I do not care to do it. My way will mean that you will be a satisfied customer and your way, or someone else's way for that matter, might not prove out and would hurt our business many times the price of the overhaul.

"I have taps and dies that will cut every thread used on your car, Mr. Lloyd, be it large for axles or small for your electrical apparatus, it matters not."

It is needless to say the mechanic got the job.

The writer saw the owner of the car

it was new—not a single rattle any place, and power to burn.

He said: "You know that fellow told me how he re-threaded all the bolts about the body, etc., when he replaced them but I just doubted it a trifle. So I removed about a dozen of them from various places

take much of their general repairing to the garage, where the garage is equipped to handle it. Only a few days ago a large printing establishment had a power-driven paper cutter, and the shaft of one of the intermediate gears which screwed into the main casting of the press, was broken.

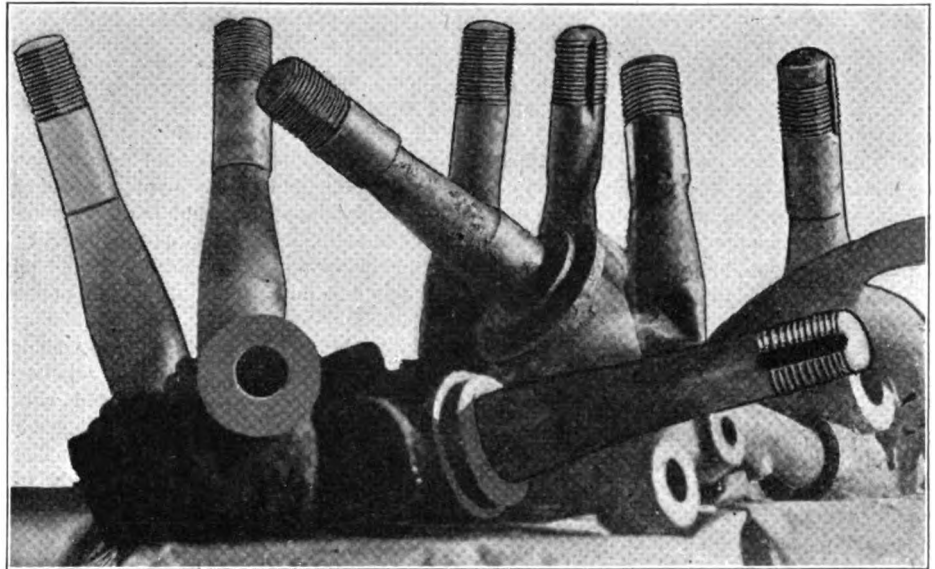


Fig. 4. Old Spindles Reclaimed From Junk Pile, Rethreaded and All Ready for Use.

about the car, just to see, and he had done just as he explained he did in an overhaul."

This particular car is on the road every day, rain or shine, and if one was not acquainted with all the facts connected with it, he would never know it was an overhauled job.

Taps and dies for general repairing have a place in every well-kept garage and

The thread used on the shaft, was a 1-inch U. S. standard, and in a city of 15,000, there was not a single die to re-thread the shaft. So the printers were forced to wire for a new shaft and lay the cutter up for nearly a week. This printing house would have been more than glad to have paid the price of half a dozen dies to get this job done at the time it was needed so badly.

Another instance, the writer calls to mind, where a 1-inch U. S. standard die would have saved a farmer a great deal of money, took place only a few months ago. A threshing rig had made a set between four large stacks of wheat, and had been running but a very short time when a shaft was broken in the threshing machine.

Plenty of shafts could be had, but no die for re-threading could be found in a radius of 20 miles, taking in four small towns ranging in size from 350 to 700 inhabitants. A shaft was ordered by telephone and was due to arrive about 12 hours later. In the meantime, a storm came up and the stacks and separator were destroyed by lightning—all for the want of a 1-inch die to thread the shaft, for otherwise the wheat would have been in the granary and the threshing rig in some other quarters, long before the storm.

To some of the readers it might seem that taps and dies are a sort of a hobby of the writer—and, to an extent, they are. I have driven a car over four states and called upon garages exclusively, and believe I am safe in saying that less than 15 per cent of them have a good tap and die assortment in their tool equipment.

(Concluded on page 36.)

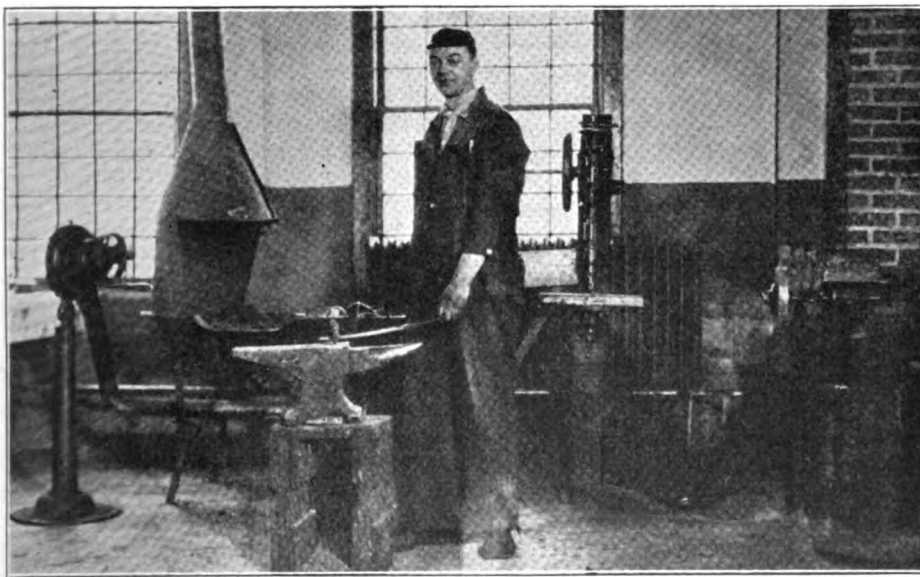


Fig. 3. Corner of Shop Where Polishing and Other Work Is Done.

some time after the job was taken from the shop and asked him what sort of a mechanic the new workman down at the big garage was. His reply was that he was no workman at all—he was simply a wizard, for his car ran like it did when

should be a part of the equipment. In making a survey of eight garages and investigating the kinds of work handled, aside from car work, the writer found repair jobs of every description in them.

It appears that the public, in general,

Teach Customers Care of Tractors

Importance of Common Neglect of Farm Machinery Often Overlooked—
Proper Care More Necessary for Tractors Than Other Farm Machinery
Because of Heavy Pressures and High Speeds—Right Grade Oil Essential

By F. H. Sweet

A neglected tractor is more likely to be unsatisfactory than one which is properly cared for. No dealer can afford to have dissatisfied customers, and since the care of the machine plays so prominent a part in having a tractor prove profitable and satisfactory to the owner, it behooves the conscientious dealer to do what he can to have his customers give their machines the attention which they require.

Farm Machinery Neglect.

Neglect of farm machinery is so common that its importance is often overlooked. It is probably true that in the case of many farm machines, exposure to the weather and lack of proper lubrication and general care do not cause so much real damage as some people would have us believe. Farm machines which are drawn by horses do not have as heavy pressures nor as high speeds on their bearings as tractors and power-operated machines. This means that neglect will not damage them so severely—and to this fact is doubtless due the lack of attention which is accorded them by a great many farmers.

In the case of the tractor, however, most of the bearings are transmitting considerable power and, therefore, work under comparatively heavy pressures. Furthermore, many of the bearings operate at rather high speeds. This means that they must be kept in first-class condition and well lubricated if they are to give satisfactory service, and the failure of any bearing or other part of the tractor at busy seasons nearly always means not only inconvenience, but loss.

A farmer who has been accustomed to allowing his binders, mowers, and other machines to stand exposed to the weather without seeing any serious deterioration from such usage, is quite likely to think that he can treat his tractor in the same manner with no worse results. This is by no means the case, however.

The bearings of most any machine, which is exposed for several weeks in bad weather, are almost sure to rust unless they have been well greased or oiled for the purpose of excluding moisture. A rusted bearing which transmits only a little power is not a particularly serious matter, but on a tractor it is quite likely to mean excessive wear; then a break-down and unnecessary expense.

Lubrication Importance.

The importance of lubrication of the tractor can scarcely be over-emphasized. On most farm machines which are drawn by horses, lubrication is not of paramount im-

portance, although good lubrication does add to the life of such machines and lessens the draft considerably. But it is hard to see much difference in the results obtained from such machines from the use of different grades of oil—and from their experience with such machines, a good many tractor owners seem to form the opinion that this will hold true with regard to the tractor.

In this they make a mistake. No tractor will develop full power and give satisfactory service unless it is lubricated with the proper grade of oil—and the same grade of oil will not be satisfactory on all makes of tractors any more than one grade of

TEAMWORK AND EFFICIENCY.

Success demands efficient direction and there is no true efficiency where right hands do not learn what left hands are doing. No one branch of an organization can be permitted to proceed with its plans until it has been demonstrated that they do not conflict with the calculations of more important divisions. This means real teamwork, but teamwork requires watchful coaching. It's hard to knock the grandstand play out of the average man's ideas and get him to realize that the team score has right-of-way over the individual record.—Herbert Kaufman.

oil will be satisfactory for all makes of automobiles. It is a rather common practice for tractor manufacturers to recommend certain brands of oil for use with their product.

The dealer should make it his business to see that the farmer does not experiment with grades of oil other than those recommended. Such experiments are almost sure to cause trouble, and the tractor often receives the blame instead of the oil. And when the tractor receives the blame, the tractor owner generally places part of it on the shoulders of the dealer who sold him the machine.

It is to the dealer's interest to see that his customers use brands of oil which are suitable for the tractor he handles. A great many tractor owners make the mistake of using whatever kind of automobile or gas engine oil is most convenient. Some of them take the attitude that if the oil is good enough for use in their automobile, it is good enough for use in their tractors, while others take the word of a neighbor, or perhaps the man who has oil to sell, regarding the oil for their tractors.

It is surprising that so many men are willing to carry on what often prove to be expensive experiments of this kind. The field men connected with the service department of large tractor concerns are constantly running across cases where complaint has been made concerning a tractor but where the entire cause of the trouble is poor oil or the wrong grade of oil.

Wrong Grades of Oil.

Just recently a farmer who owned a two-cylinder kerosene tractor of a make that was giving very satisfactory service on thousands of farms, complained that his machine would not develop his rated power and was unsatisfactory on that account. An expert was sent to investigate, but after making a thorough examination of the machine could find nothing whatever wrong with the mechanism. He asked the farmer what brand of oil was being used, and found it was one which was not included with those recommended by the manufacturer for that particular engine.

He informed the farmer that the entire trouble was probably due to the wrong kind of oil. But the owner was skeptical. The expert cut off the fuel supply of the carbureter, and asked the farmer to notice how the engine "died." The momentum of the flywheel turned it over a number of times, and then it came to a rather abrupt stop. It seemed to have a sort of jerky motion and was noisy.

The expert then drained the oil from the mechanical oiler and put in a new supply of a brand that the manufacturer recommended. After starting the motor and allowing it to run for some time in order to have the new oil reach all parts and get them properly lubricated, he again cut off the fuel and asked the farmer to note how the engine "died."

This time it ran a great deal longer than before, and finally came up against compression, stopped, and rocked back and forth two or three times. It was obvious to anyone that the engine was running more quietly and smoothly. Furthermore, when put under load the motor developed ample power, which, after all, is the final test. The farmer was amazed at the difference and admitted that the fault had been his and not the tractor's.

Different Engines—Different Oils.

The dealer should impress upon his customers the fact that different makes of engines require different grades of oil, as they run at different temperatures, have different clearances between the piston and cylinder wall, and run at different speeds,

and that oil which may work all right in one engine, may not work at all satisfactorily in another.

In the case referred to, the oil which the farmer was using was probably too light or else a great deal of its viscosity was lost in high temperature, thus reducing its lubricating quantities and preventing it from properly sealing the space between the piston rings and the cylinder wall. This allowed the burning gases to escape past the rings, and permitted some of the compressed air to escape before ignition took place.

When one takes into consideration the functions which an engine oil should perform, it is no wonder that loss of power results from the use of poor oil or oil of the wrong grade.

Overhauling farm machinery during the slack season so as to be sure to have it in first-class working order when needed, has long been recognized as good practice—it is especially so with a tractor. Nearly every tractor should have a general overhauling during the fall or winter months. This may not always be necessary after the first season's work, but it will do no harm even in this case, and after the tractor has been used two or more years an annual overhauling is almost essential to insure satisfactory operation during the busy season.

Here again is an opportunity for the dealer to be of assistance to his customers by urging them to go over their tractors or have some one else do it, replacing badly-worn and broken parts, and putting everything in first-class shape for spring work. If the dealer maintains a repair department and has a repairman on his staff who can be of assistance to his customers in this work, he will often find it to his advantage to offer to send the mechanic out to the farm while work is being carried on, the farmer to pay all, a part, or none of the expense, as the dealer may see fit. Dealers have different viewpoints on these matters.

Another point which dealers should impress upon their customers is the necessity for draining the cooling system of the tractor during cool weather, or else to use a non-freezing solution. Every winter hundreds of gasoline engines are ruined or damaged by ice forming in the water jacket. Sometimes this is due to carelessness or forgetfulness on the part of the operator. In other cases, the water freezes quicker than the operator thinks is possible, and the damage is done before he realizes how quickly water in the cooling system will reach the freezing point.

If an engine is to be used only a few days during the winter, there is no need of going to the expense and trouble of using an anti-freezing solution. All that is necessary is to drain the cooling system completely as soon as the job is finished. Incidentally, this also permits putting some hot water in the cooling system when the engine is being started, which is usually of considerable assistance in starting the en-



Gasolene Mixed with Air in Proper Proportion Forms a Dangerous Mixture.

gine when the weather is extremely cold.

A tractor which is equipped with a radiator for cooling the water should not be allowed to stand idle in cold weather more than a few minutes unless the radiator is drained or an anti-freezing solution used. Tractor radiators are designed for the purpose of cooling water rapidly and, with the temperature around zero, it requires only a few minutes to reduce the temperature of water from the boiling point to 32 degrees. If pure water is being used in the cooling system and the motor is stopped for a few minutes in real cold weather, the water in the radiator is quite likely to freeze and cause expensive damage.

Most engines which have cooling systems designed to keep the motor cool in the hottest weather, will maintain a rather low temperature in very cold weather. Quite often the temperature will be too low to permit the tractor to develop full power and to operate efficiently. In such cases, it is advisable to cover part of the radiating surface, so as to keep the cooling water at a temperature in the neighborhood of 200 degrees Fahrenheit.

Some tractors have two or three petcocks which must be opened in order to drain the cooling system completely. The dealer should make it a point to see that his customers know how to drain the cooling systems of their tractors properly, as there have been many cases where an engine or a radiator was injured by freezing, simply because the operator was not aware that there was more than one drain cock.

Familiarity with Gasolene Breeds Contempt—Beware!

Familiarity is apt to breed contempt—in the handling of gasoline as it does in other ways. All things considered, it is remarkable that more accidents do not happen and that greater loss from fire is

not experienced by public garages throughout the country as a result of handling such great quantities of this extremely volatile and inflammable liquid.

Even where precautions are taken, disastrous results sometimes follow. In such cases, however, the unfortunate outcome is usually due to forgetfulness of the fact that gasoline vapor, mixed with air in proper proportions, renders the resulting mixture even more dangerous than the gasoline itself. In explosive power, it is fully as deadly as nitro-glycerine.

This is well illustrated by the accompanying photograph which was taken less than five minutes following an explosion of this kind. Those responsible for it were exercising the usual caution that governs the handling of gasoline.

They were, perhaps, forgetful of the fact of which mention has been made. In addition to this, they were lacking in observation—all of which combined to bring about the condition pictured. It happened in this way—and the lesson which this experience holds is well for everyone engaged in garage work to store away in the back of his head.

Two men were engaged in emptying a drum of high-test gasoline into an underground storage reservoir. The filling pipe was located on the outside of the building some 10 or 12 feet from the wall. As usual, a big funnel had been placed in the filling pipe and the drum was being drained of its contents. A high wind from the south blew directly across the funnel and the stream of gasoline, and carried the vapors directly into the building through large double doors which stood wide open.

Just as the drum was about empty, an explosion occurred which shook the town. The entire wall of the building was blown out and fell about the two men, almost

burying them where they stood. A moment more and the interior of the building was a seething mass of flame. It all happened because the vapor from the gasoline, mixed with the air in just the right proportion, had penetrated some part of the structure wherein there happened to be a naked flame that touched off the gas.

Not long ago, the writer saw the driver of an oil wagon engaged in filling the

storage tank at a public garage. While his helper was drawing a five-gallon can from the wagon, the driver paused long enough in his work to make preparations to light a cigarette.

"Don't light that match or smoke while you're on that job; it's dangerous," admonished the owner of the garage who happened along just at that moment.

"What do I care!" replied the driver, and he proceeded to "light up."

Nothing happened—for conditions evidently, were not favorable for an explosion, save possibly of the garage owner's wrath. However, it is the contempt bred of familiarity with handling gasoline that results in many accidents and fires. The man who takes chances with gasoline is flirting with the coroner. And some day it is not unlikely this official will summon a group of men to sit in judgment upon the outcome of his folly.

Plans for The Easter Display Window

A Few Suggestions for Attractive Window Display Arrangements—Goodrich Service Station at Washington, D. C., Gives Good Example of Effective Dressing of Show Windows—Take Advantage of Special Days Such as Circus Day

By A. Pearl McPherson

Too often we find the service stations around our city, just dirty looking places, suggestive of oil and grease. Managers of some of these garages are waking up to the fact that they can impress their places upon the mind of the passing motorist, or pedestrian who may have need of a service station now and then, if they brighten up their places a bit.

The Goodrich service station, at Twentieth and M Streets, N.W., Washington, D. C., has converted its show windows into things of beauty, and is vying with the other business places of the city in keeping the windows well cared for and attractive. The color scheme of the window is changed about once a week.

One week one window was lined with white material, and against that rested three automobile tires, while intertwined in and about the tires were great bunches of almost perfect artificial pink and white flowers, with green foliage. The effect was altogether pleasing, and took away from the oil and grease aspect so often the feature of a service station window. The other display window, was done in deep yellow, and contained two stands, upon which were displayed the oils, grease and like materials which are for sale inside.

Instead of the plain unlined floor of the window, why not brighten up the place by using a bit of time and effort, and a small amount of money, and make it a thing of beauty?

Here is a novel idea for the Easter window, which may be displayed from the week before Easter until a few days after: Obtain one of those toy autos, without top, and in it place either small dolls or rabbits. For Easter the rabbit and chicken are so very appropriate that they might be best chosen for that time. By a little help from the female side of the house at home, these rabbits may be dressed to represent each member of a family.

The floor should be lined with dark material, and this miniature automobile should

be standing just outside the gate of one of those cunning little fences which surrounds a miniature house. The road may be shown across the floor, and a motor cop rabbit stationed in a conspicuous place. The floor might be lined with green crepe paper, and the road be made of brown crepe paper, with small pebbles holding it in place on each side. Trees, which may be

IT'S ALL IN THE REFINING.

A piece of iron that will make twelve dollars' worth of horseshoes will make twenty-five thousand dollars' worth of watch springs. A piece of ordinary coal is formed of the same substance that forms the diamond; the only difference is Nature has carried the diamond through a process of refinement. Every healthy human being is fitted out with the necessary equipment to become a finished product. It is purely a matter of the refining process through which you are bringing yourself. The same constituents are found in the flesh, blood, bone and brain of every man.—Bernard Meador.

purchased at the notion store, should be set here and there, and groups of rabbits placed at intervals along the space in the window.

The background may contain automobile tires, or the different makes of motor grease and oils which are for sale. This window may be furnished with very tiny articles and animals, as such may be found at the ten-cent stores and the notion houses, or it may be done with larger models and thus be adaptable for any size display windows.

Another unique window display for the station which handles tires is the two or three-ring circus. This may be used the entire year, or may be placed in effect just when the circus happens to be in town.

It is sure to attract the attention of everybody at any time. The tires are laid flat on the floor of the window to make the rings. Any number of circus actors may be found in the toy stores and notion shops, and one may enlarge upon the idea to any extent desired. Trapeze should be placed in one ring, and clowns placed in prominent positions. The ponies should occupy one ring, with the master standing on the automobile rim whirling his whip. The rider may be a doll which one dresses at home, or may be purchased in circus outfits at the toy stores.

The background should be filled up with cages of animals, horses with their riders and, of course, the clowns. These outfits may be purchased at any toy store, and after they have served their purpose as window decorations, they will make some little child or children happy for many days to come. Just try this circus window instead of that plain unlined floor and see what it brings. It shows one to be a progressive dealer, and up to the minute with window displays.

One of the automobile agencies has a window display which turned an advertising trick into a thing of realism not often found.

The window space is small, but it has not interfered with the display in the least. It is a real large green automobile setting on an extreme incline, to demonstrate that the automobile can make the hills any time. Real grass marks the front of the display, while real dirt has been thrown upon the built-up road where the machine is shown.

That is all there is to the display, excepting the placard which says something about "It can make the grades," but it is all that is necessary to make that window one of the most attractive for blocks around. One is almost startled into attention by seeing a handsome car displayed on a steep grade instead of in the usual manner in which displays are generally made.

Glimpses in the Garageman's World

This Holland Garageman Has Some Ideas, Too, Which United States Garagemen Will Find Valuable—For Instance, This Plan of Individual Garages—It Is Just Being Adopted in This Country—A Good Scheme, Isn't It?

Novel Accommodations Offered by Holland Garagemen.

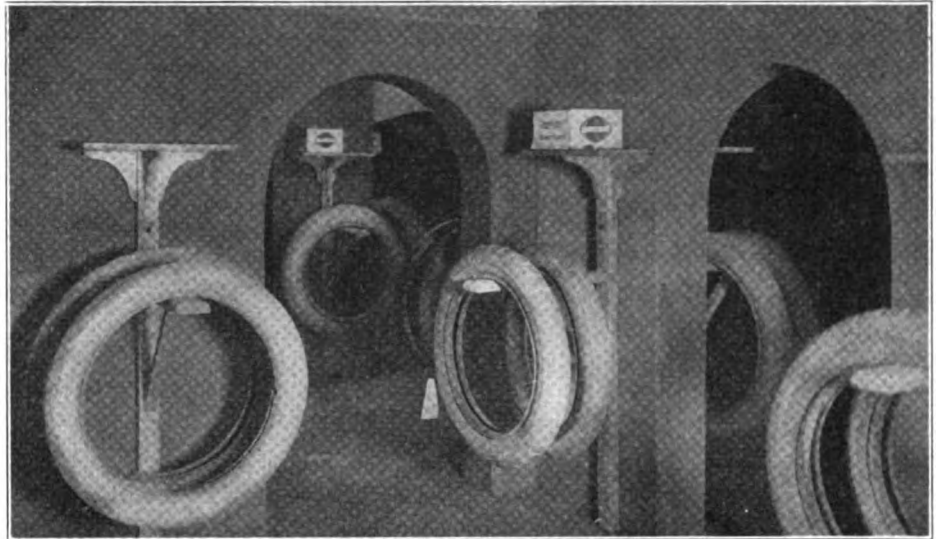
Holland is a long way from America, but that isn't saying that the Holland garageman hasn't unique and interesting ideas that could be adopted to advantage by garagemen in this country.

Situated on Reinkenstratt, the Hague, is an unusual establishment. It is owned by Naaml Venn Hamin, distributor for Mitchell automobiles. In architectural style it resembles that of a fine old chateau. Between attractive show windows is a driveway that leads to a spacious paved courtyard.

This is directly in the rear of the showrooms of the establishment and comprises a remarkable arrangement of more than 60 easily-accessible fireproof garages, constructed of brick, each separated from its neighbor by concrete walls. Each car owner has a key that unlocks a small compartment in front from which a handle is released that very easily rolls up a fireproof shutter giving full width opening to the garage.

Since the accompanying illustration showing the small garage was made, an additional locker, as well as a table, has been placed in each. A specially-designed tire rack, also an electric light as well as a skylight will be noticed. These buildings are steam-heated. There is a water faucet between every two garage doors.

The monthly rental of these garages is



Tires Are Stored in the Dark, Cool Basement of This Holland Establishment.

40 guilders, equivalent to about \$13 in United States gold, for which at least one washing of the car a week is guaranteed and twice when time permits.

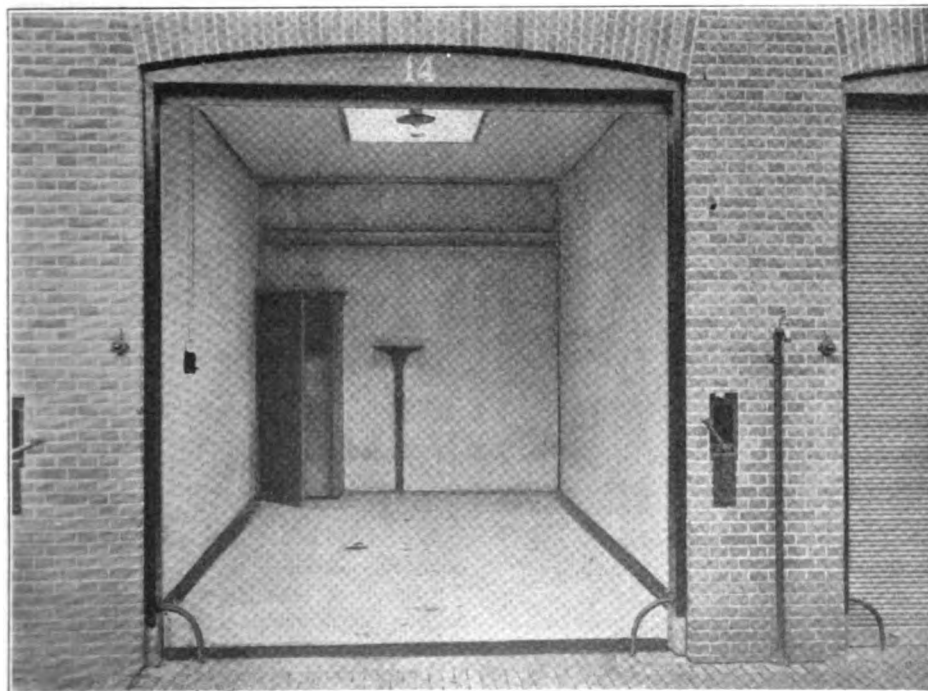
Beside lounging rooms for customers, there are several rooms for the comfort of chauffeurs. Above the showrooms are apartments.

The cool and dark basement of the main building is used for tire storage, unique racks being employed, over each of which a small shelf is placed containing

boxes of inner tubes that properly belong to the tires on that particular rack.

A complete service station including a machine shop is situated at the rear of the courtyard occupied by the private garages.

For those who do not have home garages, particularly residents of the medium and larger size cities, this idea appeals as it gives them a sense of security in having their own individual fireproof buildings.



The Car Owner Has Every Convenience in One of the Individual Garages.

Thank You! We're Glad.

Wiscasset, Me.

American Garage & Auto Dealer,
Chicago, Ill.

Gentlemen:

I am writing this letter to let you know what I think of your valuable paper.

It is the best monthly trade paper that I have seen yet, and I have taken all of them, I think. Now only yours and one weekly are all I will take under any consideration.

Would you like a picture of our garage and also a story of our business growth in the last nine years as an article for your paper some month? If so, I will do my best to get it up for you.

Thanking you for favors in the past, I am,

Very truly yours,

L. B. Haggett.

Haggett's Garage Company.

Welding, Cutting and Brazing Practice

Sheet Metal Welding a Branch of Torch Operator's Trade That Is Useful in a Variety of Ways in Automotive Repair Work—Some Practical Hints in Making Sheet Metal Joints—Detail Instructions for Making Welds

By David Baxter

Some knowledge of the art of oxy-acetylene welding, as it applies to the welding of what is called sheet metal, should be in the repertoire of every welder in the garage as well as the general repair welder. This branch of the torch operator's trade is useful in a variety of ways in automotive repair work, and there are lots of things the welder can manufacture of sheet metal if he so desires.

The term "sheet metal" means iron or mild steel in the form of thin flat sheets or pieces, such as is used in tanks, bodies, fenders, etc.; also thin copper and aluminum sheets.

Sheet metal welding is practically a separate branch of the trade. It often happens that a welder, who is expert on castings and forgings, finds he is unable to handle sheet work satisfactorily without some practice of instructions. The reverse is true, too: The specialist in sheet welding is often unable to successfully handle castings.

Although sheet metal welding is simple in comparison with the other kinds, it requires considerable skill and good judgment. There are certain fundamentals that can not be overlooked, but there are several things that may be omitted from the process of welding, when working on sheet metal, which must be done when welding castings or forgings.

Sheet metal welding might well be divided into several branches, such as tank welding, boiler welding, and the manufacture of metal furniture and containers, each of which embodies certain features peculiar to itself, and each of which requires a little different application of the torch method. However, one welder may learn to handle all of the different classes, although some prefer to specialize in certain kinds.

It is not within the scope of an article such as this to cover all of the branches and their ramifications, but it is the writer's intention to touch upon the main features of each class and go somewhat into detail in regards to sheet welding as a whole, especially where it concerns automobile repairing.

In the first place where the welder must, when welding castings, preheat the job in order to take care of expansion and contraction, the sheet welder may practically eliminate this tedious part of the work, insofar as it concerns preheating to prevent cracks or inner strains. Expansion and contraction act, of course, as they do in all metal which is subjected to heating and cooling, but the effect is different

on sheets due to the nature of the metal, which literally absorbs the strains due to these forces.

The effects of these reactions show up in the form of distortion instead of cracks in the weld; instead of cracking, the welded article will warp or pull crooked if not properly guarded. If allowances are not made, the contraction will draw the sheets out of shape. They will distort while expanding, if overheated, while preheating to facilitate the welding is an essential on some classes of heavy sheet work. The welding of heavy sheets or slabs will scarcely ever come to the garage welder, so it need not be more than mentioned here. And on this account the garage welder may consider the item of preheating eliminated when welding sheet metal.

Another feature that may be omitted on much of the garageman's sheet work is the chamfering of the edges to be welded—that is, the grooving of the weld may be omitted. This is one thing which is very essential on all other classes of welding, with the possible exception of aluminum castings. On other kinds of work, the line of welding should be grooved

the same as for castings, but this, too, is outside of the garage welder's realm and need not be discussed here except as has been stated.

Some welders make a practice of flanging the edges of the sheets to be welded in lieu of chamfering. The edges of the sheets are bent upward in proportion to the metal thickness; that is, the flange is bent along the edge of the sheet which stands up the amount of the metal thickness.

For instance, if the sheet is one-eighth of an inch thick, the flange is to be one-eighth of an inch high; 1/16th if the sheet is only that thick. This flanging is for the purpose of furnishing bonding metal and is melted down level along the weld. Both flanges are welded into one making, if both sheets are welded, what is termed a flange weld.

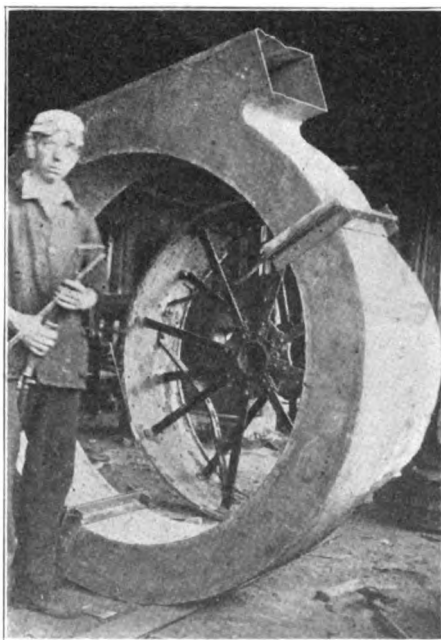
If the operator has had some experience, he may make a butt weld instead of a flange weld. In this, the sheets are welded flat without preparation. The edges are melted and knitted together with filler-rod metal. If properly executed, the butt weld is just as strong and looks neater than the flange weld. Of course, in this and also in the flange weld, it is not considered good practice on sheets over 5/32nds of an inch thick. As previously stated, metal over this thickness should be grooved for best results.

There is yet another joint sometimes used in sheet welding, although it is more difficult to execute properly, and probably is no stronger. In fact, it is not as strong unless the operator is an expert. This is what is known as a lap-weld.

The sheets are lapped, one over the other, and the upper one is melted and soaked into the lower so they will become one homogeneous mass. The difficulty in this lies in melting through the upper to reach the lower and to melt it without burning the upper.

If the lower lap is not melted, the joint will not be a weld but a mere adhesion. The factor of distortion acts to such an extent that lap-welding is really only useful for short welds; arrangements to counteract distortion are too complicated to permit lap-welding to be economical.

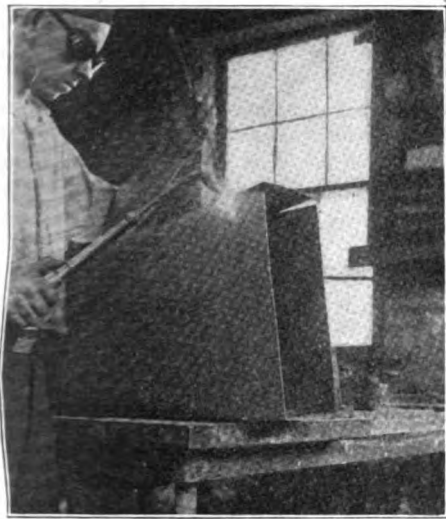
Let us see what is essential in regard to flame and filler and their manipulation. In the first place, the flame would be strictly neutral on all classes of sheet work which the garage will be called upon to do, unless it is aluminum or copper. Even then the neutral flame is the safe one for beginners.



Good Example of Sheet Metal Work.

to insure a well-fused weld, almost regardless of the metal thickness, but on sheet metal work, only metal over one-eighth of an inch or at most 5/32nds of an inch in thickness need be grooved. Sheets over these dimensions should be grooved about

The expert may reduce the power of the flame for aluminum or copper sheets in order to aid in the prevention of oxidation, due to the low melting point of some of the components of the metals. But,



Ends of Sheets Gradually Draw Together.

as has already been said, one article can not cover all kinds of sheet welding, so we must hold closer to one class—the mill steel or wrought iron sheets. And this, too, for metal under $\frac{3}{8}$ ths of an inch thick.

In consideration of these facts then, let us say that the correct flame for sheet metal work is a strictly neutral one. This flame is the one that is the least liable to oxidize or to carbonize the metal. A flame that has an excess of oxygen is liable to cause the metal to oxidize or burn, even though the operator handles it carefully. The oxygen that is not consumed in the combustion of the flame combines with the molten metal to form oxide, either in spots or through the whole weld, thus rendering the bond brittle and porous.

A flame carrying too much acetylene is liable to carbonize the metal and render it hard and brittle. The acetylene gas is rich in carbon and if this is not all utilized in combustion, it combines with the molten metal to make it nearly worthless. The carbon may even be injected deep enough to harden the whole weld. Therefore, the flame should carry only enough of each element to cause correct combustion.

The matter of flame size is also important. A flame too large can ruin the weld about as readily as an oxidizing flame. The average welder can not work fast enough to prevent a large flame from burning the weld. On the other hand, if the flame is too small, it will cause a poorly-connected bond as the heat is not sufficient to supply conduction and still keep the weld molten enough to flow.

Although there is a happy medium in the matter of flame size and although the manufacturers will furnish tables to guide us in the proper sizes, the welder will find that he can use a little bit larger or

smaller flame if he manipulates it with good judgment. For instance, he can use a larger flame than is recommended if he works it around more rapidly and holds it farther from the weld, or directs its force at different angles, according to the way the melting acts.

In these things the operator may be safely guided by his experience on other classes of welding, since the torch size and its handling are practically the same on casting as on sheet work.

We have now used about all the space afforded for generalities, so let us turn to some specific cases. Take first the matter of distortion since it is, no doubt, the torch operator's worst enemy when welding sheet metal. This is best illustrated in simple straight welding, such as the welding together of two flat pieces of sheet iron.

If the sheets are placed edge to edge flat upon the floor or welding table, the edges parallel, whether they touch or not, and are welded from one end to the other, the operator will find that by the time he has reached the opposite end, one sheet has lapped over the other to such an extent as to ruin the work. As the welding proceeds, the cooling metal behind the torch contracts and pulls the sheets toward each other, finally causing them to overlap.

No matter how fast the operator welds, the sheets will overlap before he can reach the other end if he makes no preparation to counteract the pull, providing, of course, the sheets are several feet long. If the sheets are fastened in such way that they can not move, then the distortion will be in the shape of kinks or waves along the seam, such as in the welding of a side seam of a tank.

It sometimes happens when welding the side seam of a tank that the weld metal will contract and form a sharp ridge along the weld. In other words, the cylinder

if the welding is accurately performed, the sheets will be drawn together in a straight line when the weld is finished.

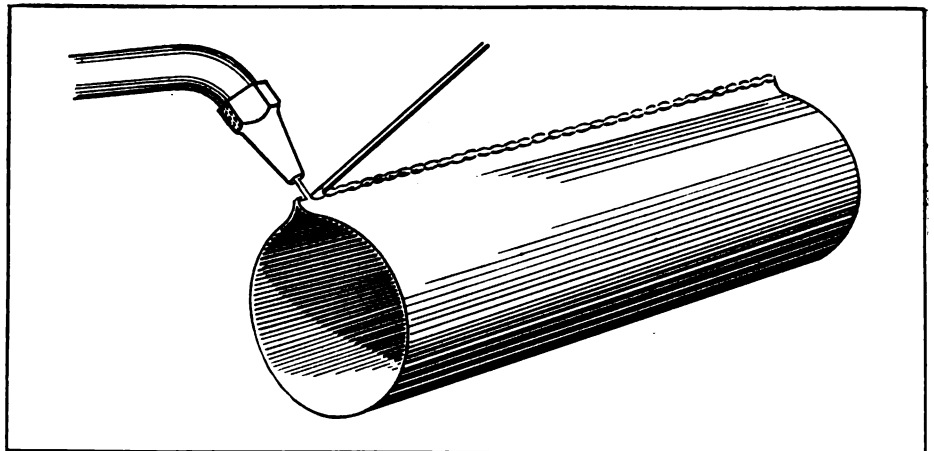
Some welders have fair success in preventing the overlap by spot-welding the sheets together at intervals of five or six inches along the seam. Even then, they must weld rapidly and the welded seam must have no unequal portions; the whole weld must be about the same thickness and width. There must be no piling up or scantily filled portions.

After spot-welding the seam, the flame is applied to the second spot first and worked gradually back to the end of the sheets instead of starting at the ends and working onward to the finish. When the first part is welded, he skips a space and applies the flame to the third spot and welds back to the beginning of the first weld. In other words, he welds backward to the second spot. The whole seam is welded backward, in sections, the same way.

Another device employed to prevent overlapping is that of wedging the sheets apart in advance of the welding. As the seam draws together, the wedge is loosened and moved back. But this, in reality, is only a variation of the spreading method, for if the sheets seem to be drawing together too rapidly, a wedge is often inserted to retard the effects of contraction.

A great deal of the success of this operation depends upon the skill and rapidity with which the weld is made. If the welder is inclined to be slow and awkward, the sheets will draw together faster than he can make the weld. On the other hand, he may be forced to stop welding once in awhile to permit the contraction to overtake the weld.

From this, it may be inferred that the welder can control the distortion by the way he manipulates his torch, which is true to a certain extent. After he has



Tube Distorted by Improper Welding—Edges of Sheet Touched Parallel During Process.

will not be round but will be drawn out to a point where the two sheets meet.

About the simplest and surest way to prevent or overcome distortion is to spread the sheets apart at one end of the intended seam. If this is carefully estimated and

spread the sheets apart at one end and starts to weld, he can tell just about how much the spread is closing. If it is closing too fast, he wedges the sheets apart and welds faster if possible, even to the

(Concluded on page 36.)

Readers' Questions and Answers

Adjustment of Carbureter.

We would be very much pleased to have you let us know as to the proper adjustment of a Ball & Ball carbureter such as was put in the 1916 King eight.

The only adjustment that can be made on the Ball & Ball carbureter, is the idling adjustment.

This produces no effect on the running of the car, except when the throttle is closed to idling position. The richness of the mixture at all other speeds is controlled by calibrated orifices in the jets.

However, trouble may arise from obstruction in the fuel passages or dirt collecting in the jets. These jets may be removed and cleaned with compressed air or a fine wire.

* * *

Cementing Water Jacket Leak.

Can you tell me the best kind of cement to use to temporarily stop a leak in the cylinder-block of an engine? The car was brought into my shop recently and the owner does not want to have it taken apart to be welded. Will the crack become worse by not being welded at once?—H. H., N. Y.

There are special iron cements that often give very good results. If the crack is not too wide and long, and not subjected to very severe strains, a good iron cement should close it, for some time, at least, if used according to directions.

We presume that this crack is in the water-jacket wall only and we doubt if vibration will open it much more, but, of course, it is better to have it repaired as soon as is convenient. Perhaps a properly formed sheet metal patch, with jacking under it, could be screwed on over the crack, without taking the block down.

* * *

Carbonization.

Does the carrying of oil too high in the crank case tend to cause carbonization?

Does the use of oxygen to remove carbon injure the cylinders or pistons in any way? Please tell me a good way to remove carbon.—H. D., N. Y.

Carrying oil too high in the crank case may result in there being too great a depth of oil for the connecting-rod ends to dip into, too much oil being splashed, a greater tendency for oil to work up onto the piston heads and thus more likelihood of rapid carbonization.

Some manufacturers advise that the oxygen system should not be used on certain engines. Generally speaking, if this method is properly applied, there is little risk in using it. A bad feature of this method is that the incombustible part of the deposits is not fully removed and works down into the engine.

One of the best ways of removing car-

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

bon is to remove the head and scrape all the parts.

* * *

Welding of Malleable Iron Castings.

Kindly inform me as to the best way to weld malleable iron castings and also what to use to weld same. I take great interest in the articles on welding which you publish.—A. M., Ohio.

Bevel the broken edges about the same as for cast iron welding, according to the thickness and nature of the casting. Use a strictly neutral flame a trifle larger than the usual size for cast. Play it zig-zag across the fracture until the surface of the malleable iron shows signs of melting, then introduce the filler rod.

As the surface of the malleable iron commences to melt, add the filler, which should then be ready to deposit. But, whatever you do, melt only a very thin skin of the surface. In fact, some welders do not bring it to a melting stage before depositing the filler but spread the molten filler over the malleable iron as soon as it becomes bright red.

As fast as the filler is deposited, the process is moved along the fracture to keep a constant supply of filler flowing onto the casting. Keep applying the flux liberally to the melting metal and keep the flame moving.

Use a Tobin bronze filler rod and pile it up well along the fracture to reinforce the bond. Smooth this surplus filler bronze with the force of the flame but do not pause long over any portion of the bond.

Strictly speaking, this is not a fusion weld since the two metals are not really fused into one. The bronze is merely adhered to the malleable iron. It is in reality

a brazed joint, but to our knowledge it is the best way to repair broken malleable castings.

When any attempt is made to weld this metal with steel or iron in the usual way, the malleable iron is turned to a white, brittle, and worthless metal, due to the melting.

* * *

Faulty Generator.

What is the trouble with a generator that has been set ahead as far as possible, but won't deliver any more electricity to the battery?

Can an ammeter be put on a car in place of the charging indicator that came on it? There are three wires leading to this indicator.—W. P., Ariz.

A common cause of insufficient output from a generator is the improper condition of the commutator and brushes. If the former is perfectly clean and true and the brushes bear on the commutator with sufficient pressure being well fitted to it with their ends free from glazing or dirt, you ought to obtain the full output, assuming that all connections are tight, and there is nothing wrong with the winding.

As a general rule, an ammeter can be installed in place of the current indicator. It would perhaps be well in buying the ammeter, to specify the name and year of the car.

* * *

Correct Position of Driving Gear.

One of our customers in attempting to overhaul his car, a Mitchell six, removed the generator without locating or marking the gears and then removed the entire distributor mechanism from the generator.

After the generator has been replaced and the driving gears for it set to the correct position by the marks, how can the correct position of the driving gear for the distributor be found?—E. G. L., Nebr.

You do not mention the model of the car you speak of. Some of the models have the adjustable cam in the distributor. Others must be set with the distributor gear.

However, the driving gear of the generator requires no marking and may be set anywhere on the camshaft gear. If you proceed as follows you should have no trouble:

First, install generator on the motor (or engine). See that camshaft gears are set properly. Bring No. 1 piston up on compression stroke watching the D. C. mark on the flywheel of the engine until it reaches its highest point or just breaks over (slightly). See that the spark lever is fully retarded.

Set your distributor gear in mesh so that contacts in the distributor just break and the distributor arm is located directly under the wire contact leading to No. 1

cylinder. The generator should not be removed after the distributor is set, as each time the generator is removed, the distributor must be re-set.

* * *

Vulcanizing Equipment Suggestions

I am thinking of doing vulcanizing work as a side line in a garage in a town of 3,000 population. Please tell me what kind of a vulcanizer is best to buy? What should one charge? How long does it take to learn the business? Should one go to school? Can you give me any other pointers? I have been considering the Shaler vulcanizer.

The best outfit for anyone to buy is a standard vulcanizer that will do every kind of tire repairing that it is practicable and profitable to do. Most repairmen do not find retreading profitable on account of the expensive equipment it requires and owing to the fact that it really requires an expert to do the work satisfactorily. Tube repairing and casing blowouts, either on the side or the tread of a tire constitute a good deal more than 90 per cent of all the tire repairing that is done with any kind of vulcanizing.

Prices charged for tire repairing are more a matter of competition than anything else. Our idea of charges, however, is that they should be based on the cost of material used, plus a reasonable rate per hour for the repairman's time, plus a legitimate charge for the machine and for profit which probably should equal about the charge for the repairman's time. There should also be

an allowance for overhead, such as rent, heat and light.

Anyone in the tire repair business should remember that the business is more or less one which operates in the summer time and, therefore, he must figure on making enough profit in the summer to carry him through the winter.

The actual repairing of tires is very simple and anyone with ordinary mechanical intelligence who will follow the instructions that are furnished with the vulcanizer can make first-class repairs from the beginning.

We would suggest, of course, that a prospective repairman immediately begin to keep in touch with what is being done in tire repairing by others. This would include the careful reading of one or two trade publications, probably one which goes to the automobile business in general and another which specializes in tire repairing.

The Shaler vulcanizer is a good vulcanizer and the manufacturers declare it is unnecessary to go to school or spend a lot of time learning the business.

* * *

Valve Timing.

Can you tell me the right way to time a four-cylinder, high-speed engine? What causes an engine to knock when there is no carbon in it and the bearings and pistons are as good as new?—E. R., Ore.

The following is the typical setting used in high-speed practice:

Intake opens 12 degrees past upper dead center, inlet closes 33 degrees after lower

dead center, exhaust opens 55 degrees before lower dead center, exhaust closes 12 degrees past upper dead center.

Under conditions such as these which you describe, the most common causes of knocking are the following:

Too early spark, engine loose on frame, cylinder block loose on crankcase, loose flywheel, timing gears loose on shafts or some of their teeth damaged, loose push-rods, worn or loose cams, or compression too high for the quality of fuel used

* * *

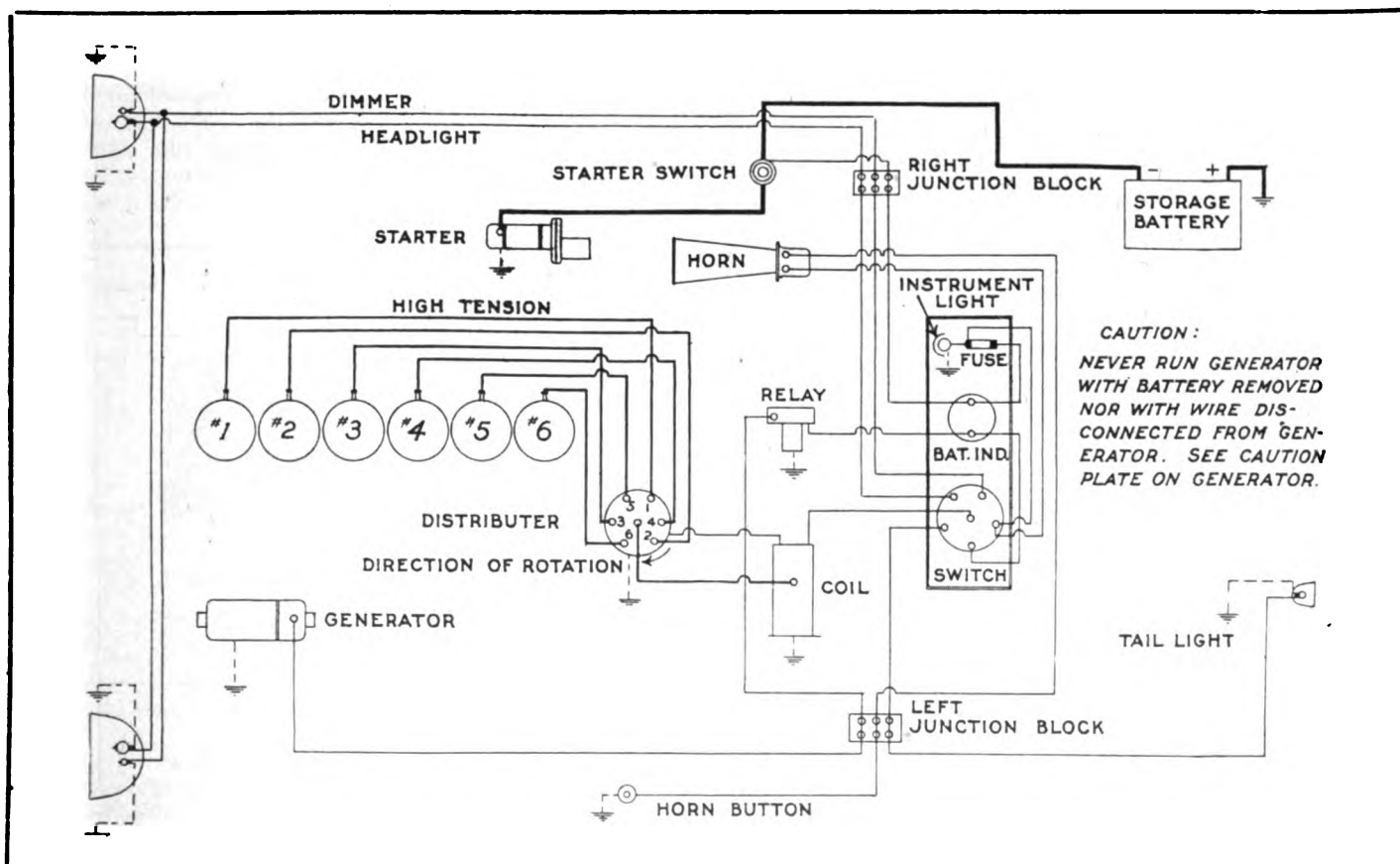
Installing Ammeter.

We have a model 54, 1914 Oldsmobile six-cylinder with Delco system, but it has no ammeter. How can one be attached and how large should the wires be?—K. M. C., Pa.

The ammeter can be installed by cutting the battery circuit and installing the ammeter in series in the line. Care should be taken to see that the ends of the wires are connected to the proper terminals of the ammeter.

Should the wires be wrongly connected, it will be indicated by the pointer of the ammeter remaining over on discharge after the motor is running, meaning that the current is flowing through the ammeter in the wrong direction and the wires should be changed on the terminals of the ammeter.

Should extra wire be needed to make connections, No. 8 copper wire should be large enough.



The Wiring Diagram for the Elgin Six.

Practical Hints for Shop Mechanics

Leaking Valves.

The first hint of leaking valves is usually a hissing sound in the cylinders when compression occurs. The best method of following this clew is simply to turn over the crankshaft slowly, listening meanwhile to determine the location of the leak.—N. D., Mich.

* * *

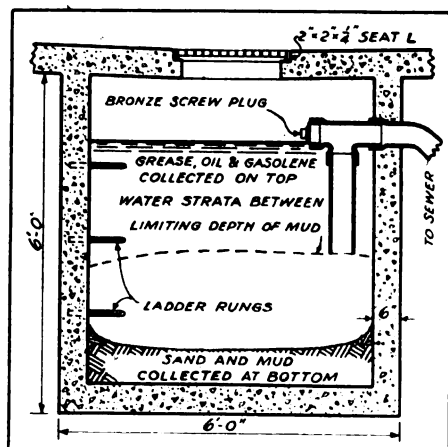
Washrack Sump.

As a solution of the washrack problem in the garages of the city of Greeley, Colo., R. W. Gelder, city engineer, devised and installed a trap under the washrack at the city garage. This trap is proving so successful and so popular with the city fathers that it will probably soon be required for all the garages in the city under the provisions of the new garage ordinance.

This problem came about in Greeley because certain garages forced the city to spend considerable time and money in cleaning out sewers filled with dirt because the traps used were inadequate.

The chief merits of the city's trap are that it must be cleaned out when it is needed or it cannot be used, and that the dirt is held in the trap and not washed into the city sewer. When the sand and mud collecting at the bottom of the trap rise as high as the cast-iron nipple shown in the accompanying illustration, the outlet is stopped up, no dirt can run into the sewer, and the trap soon floods the garage floor above thereby giving warning that it must be cleaned out. The trap also provides for the flushing of the sewer.

If this trap is built with the dimensions shown in the drawing, it will hold about



Clever Trap Solves Washrack Drainage.

two truckloads of dirt and will, as stated, give definite warning when it must be cleaned out. After that it is useless until it is cleaned.

The illustration shows the materials used, the method of construction, and the operation of the sump. The installation is

ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

but slightly more expensive than that of the inadequate and inefficient traps generally in use.—B. N., Mich.

* * *

Speedometer Gears.

Should a mechanic be called upon to adjust a speedometer, that has been used on one size tire, so that the same speedometer can be used on another size, it might be suggested that the only step necessary is to see that the number of teeth in the road-wheel gear is equal to twice the number of inches in the diameter of the wheel.—F. L., Iowa.

* * *

Locking Nuts.

In some cars even spring washers do not hold the nuts in place for more than a brief period. By pouring molten tar all over the protruding threads of such nuts until they are filled in, it will be found that the nuts will be held securely for some time.—R. K., La.

* * *

Use of Cotter Pin.

A cotter pin is useful on occasion to help in deflating an inner tube that has been punctured by a nail or in such a way that it still holds the air.

The cotter pin is compressed with pliers, and the end passed through the tube wall, after which it is allowed to spring open. This opens up a large hole to permit the air to pass out quickly.—G. L., Va.

* * *

Proper Idling.

Owners of cars containing small-bore, six-cylinder engines sometimes complain of the difficulty of obtaining proper idling. It is usually assumed that the carbureter is at fault.

As a matter of fact, the trouble is usually caused by the spark-plug gaps being set too close. This causes the motor to roll when idling with all the symptoms of loading.

By increasing the spark gaps and cleaning the plugs, the trouble will be cured.—M. C., Ky.

* * *

Removing Spots.

The best way to remove spots from varnish is to rub in well a little boiled linseed oil with a soft rag until all the spots have disappeared, afterward removing the superfluous oil and polishing with a soft rag.—B. S., Ind.

* * *

Patches for Tops.

During the summer months small holes are often worn through the roof of the car top when the cover is too good to discard. They most frequently appear where the cover wears on the bows.

Take a piece of leather from an old seat cover, trim to size required and round the corners. Apply shellac to the undressed side and when it becomes "tacky", press over the hole from the inside of the top. Then take a scrap of rubber drill and apply a patch over the hole on the outside. This will make the top weatherproof once more and is easily and quickly done.—W. T., Mo.

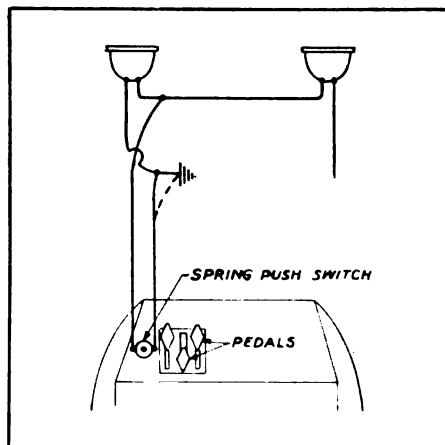
* * *

Not For General Use.

The accompanying sketch shows how the wiring of a Ford may be slightly changed so as to obtain a brighter light when going slow in high.

The wires may be fastened any way just so one is attached to the wire connecting the two headlights and the other to the ground wire.

The wires are so connected that when



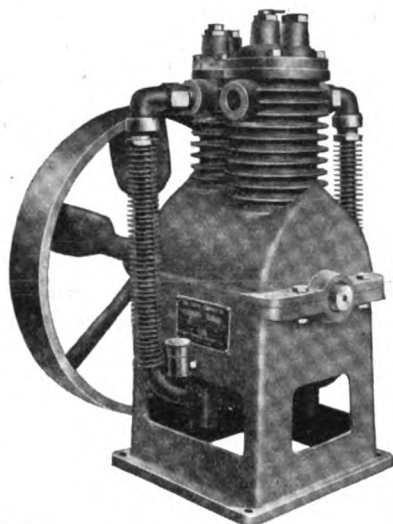
Ford Wiring for Brighter Light.

an ordinary spring push switch is pushed down, the current all goes to one lamp and gives much more light when the car is going slow in high. When running in low, the driver cannot press the switch, and will not burn out any bulbs as his left foot must

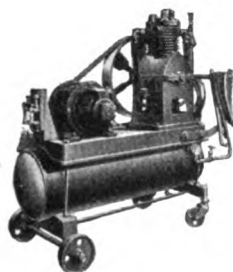
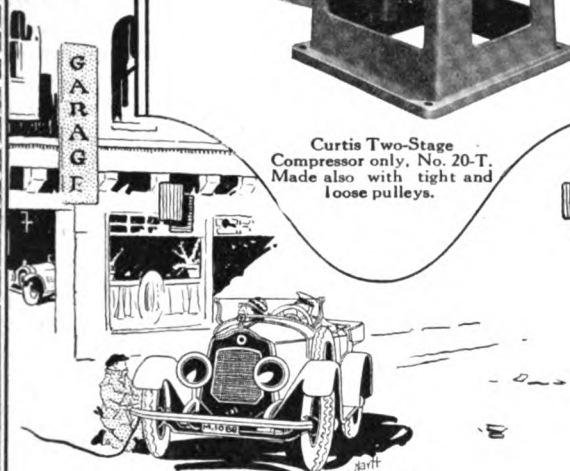
CURTIS

TWO-STAGE *Air Compressors*

An Original Design

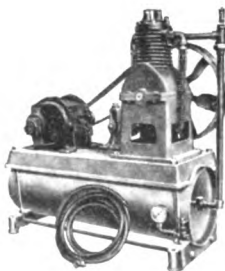


Curtis Two-Stage Compressor only, No. 20-T. Made also with tight and loose pulleys.



Curtis Style "X" Portable 2-Stage Motor-Driven Compressor Unit. Made in $\frac{3}{4}$ or 1 H. P. capacities. Furnished with or without automatic starting and stopping device and centrifugal unloader. A. C. or D. C. Motor.

Curtis Style "V" Stationary 2-Stage Motor-Driven Compressor Unit. Made in $\frac{3}{4}$ or 1 H. P. capacities. Furnished with or without automatic starting and stopping device and centrifugal unloader. A. C. or D. C. Motor.



Every Good Feature of the Single-Stage—Plus Two-Stage Efficiency

Curtis Two-Stage Compressors embody all the exclusive features that established our single stage so firmly on the market—and in addition have all possible advantages of two-stage compression. They mark another epoch in original compressor design in which Curtis engineers have attained leadership throughout our 67 years' manufacturing experience.

Curtis designing engineers have been the only ones who have recognized the superior heat radiating characteristics of copper over other metals, particularly cast iron. Copper throws off heat 135% faster than cast iron. The advantage of two-stage compression over single-stage is lost by improper or inefficient intercooling.

Curtis Intercoolers are made of copper tubing with thin copper radiating fins rigidly attached. This assures the most efficient form of cooling and the fullest advantage of two-stage compression is obtained.

Curtis Two-Stage Outfits are built in several styles, in two capacities. Your jobber will give you full information. Insist on a Curtis. Rather than accept a substitute, write us direct.

Curtis Pneumatic Machinery Co.
1515 Kienlen Avenue St. Louis, Mo.

Branch Office
530 U Hudson Terminal, New York, N. Y.



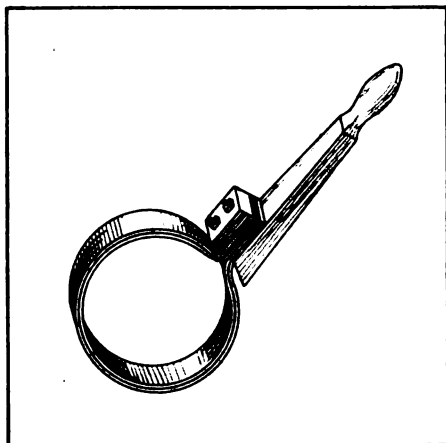
Established 1854

be used for the clutch. When going fast, the foot may be removed from the button. This scheme is only useful when going slow and around corners.—E. S., Iowa.

* * *

Tool for Removing Lamp Doors.

Do not struggle with obstinate lamp-door rims and risk breaking the lenses.



This Tool Starts 'em Every Time.

Make a tool for the purpose and remove them easily.

Take two layers of brake-band lining long enough to reach around the door rim and fasten it to the end of a lever with a hardwood block and two $\frac{1}{4}$ -inch bolts. This is used the same as a fruit jar wrench and will start them every time.—R. W. T., Mo.

* * *

Attaching Chains When Stuck.

According to my customers, about 50 per cent of them get stuck with their chains under the rear seat, as was my case lately. I took my chains out and laid them down in front of the rear wheels and then fastened the end of the chain through the spokes of one rear wheel and then the other end tight on the wood rim with four inches of heavy wire plus the use of pliers. The other rear wheel was treated the same way.

I then got in the machine and put it in first gear, gave the rear wheels one complete turn, got out and took the short piece of wire off and fastened the chains as is usually done when attaching. I then got in the machine again and pulled right out nicely. The same trick can be done if you lay the chains back of the rear wheels and use the reverse gear.—W. T. C., Dela.

* * *

Speeding Up Valve Grinding.

It often happens that a badly-pitted valve takes a lot of grinding. Here's the way to speed it up and reduce labor, particularly on hard tungsten:

Take a few strips of sandpaper of medium grit, punch holes in them. Put the valve in the hole, then the motor block in its guide and give a few turns. Remove paper and grind in the usual way.—F. H. R., Mont.

Eyelets for Lacing Holes of Belts.

On small machine belts, especially where lacing must be done with no shop equipment at hand, eyelets are handy in the lacing holes.

Belts on automobile fans, for example, become worn, and the lace pulls the holes out so that the belt has to be taken off, cut and readjusted, sometimes on the road. I took my automobile belt to a shoemaker and had him place a shoe eyelet in each of the holes, strengthening it as well as making repairs easy.—C. H. T., Pa.

* * *

Use of Gaskets.

Oil joints should be fitted with gaskets made of wrapping paper, while water joints should have asbestos gaskets coated with graphite. Hot gas joints, on the other hand, should have copper asbestos and dry gas joints call for coated asbestos.—R. B., Ia.

* * *

Ford Crankshaft Repair.

After the rear main bearing in a Ford has worn, it allows the crankshaft to work back and causes the gap between the magnets and the field to be too wide. This causes hard starting as the electricity fails to flow through too wide a gap.

To remedy this, we remove the crankshaft and build up the metal of the crankshaft with strips of brass brazed on. Do this with both the front and rear main bearings and the end play will be removed.

As this part runs in oil, the repair will endure for a long time.—T. R., Mo.

* * *

Missing.

When missing occurs in one cylinder at slow speed while the firing is all right when the speed is raised, it is a pretty good guess that the fault lies in too wide a spark gap in the plug of that cylinder.—M. G., Mich.

* * *

Judging the Mixture.

If the mixture is suspected of being too rich, shut off the fuel in the tank and open the throttle. If the mixture passing into the cylinders is too rich, the engine speed will increase as the level of the gasoline in the float chamber is lowered, since this operation weakens the mixture considerably.—D. P., Ind.

* * *

For Worn Bushings.

Sometimes bushings become loose and turn in their guides or knock before they are worn enough to necessitate new ones. This can be remedied by removing the bushing and sandpapering the entire outer surface and then tinning with solder.

Care should be taken to get the solder on with a uniform thickness all over to insure good alignment.—A. E. L., Mass.

* * *

Cleaning Carbon.

In cleaning carbon from a Ford motor, it often gets into the capscrew holes. This can be easily removed by using a 7/16-inch standard tap, and a T-handle tap wrench.

A drop of oil on the tap will give better results.

This is an easy way to remove the carbon from the holes and the threads, and will allow the cylinder-head capscrew to be screwed home without the danger of breaking it off.—E. W. S., Ill.

* * *

Lining Up Bearings.

In scraping-in bearings, the first consideration is the proper mesh of the timing gears. The front bearing controls the position of the crankshaft and its gear; consequently it should be fitted and scraped in first, the other end bearing being lined up with it at the same time. Then the middle bearings are fitted in line.

* * *

Linseed Oil for Lubricant.

Linseed oil mixed with a small amount of graphite is recommended as a lubricant for door hinges and latches. Ordinary cylinder oil has a tendency to run which is not desirable in the warm climates because the clothes of passengers are likely to come in contact with it.

* * *

Soft Water Best Cooler.

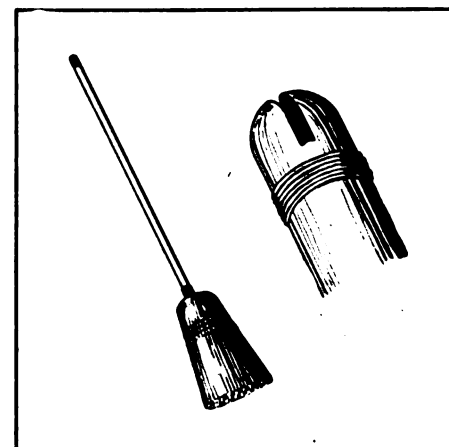
Soft water is much preferable to hard for use in the cooling system. In cases where such an arrangement is possible, it is an excellent stunt to place a reservoir on the roof of the garage.

Rain water is soft and makes an excellent cooling liquid, but after it is drawn from the tank it should be filtered before being placed in the radiator.—G. S., Ill.

* * *

Petcock Opener for Ford.

The accompanying illustration shows how an old garage broom may be fixed for use as a petcock opener for a Ford car. It is often very annoying to have to get down with a pair of pliers and reach under the car to open the petcock on the oil case, to find out the level of the oil.



Garage Broom as Petcock Opener.

By sawing a notch in the end of the broom handle, and wrapping some fine wire around the handle to prevent splitting, the garage broom may serve two uses, and save some tempers besides.—V. S. L., Wyo.



Boy and Slate Signs that made the Nation laugh

One day the Nation awoke with a new grin on its face.

It had seen the most unique advertising novelty ever devised.

On hundreds of corners, and in as many blocks, a ruddy faced boy stood. He was "some" boy. Over six feet tall, he held in front of him a great slate on which was chalked a witty saying.

Day after day the boy stood there to catch the passing eye and day after day he had something new and laughter provoking written on his slate.

And the people laughed and they talked about the "Boy and Slate" signs that had sprung up everywhere, and laughing they remembered that the boy was advertising a brand of motor oils and gasoline—the EN-AR-CO brand.

Today there isn't a better known advertising stunt anywhere. It attracts attention, it brings people out of their way to read the new witty sayings, it creates interest and sales for EN-AR-CO products.



The wording on borders of sign is permanent. The wording — "Cheer up! The less you have the more there is to get," is chalked on and can be easily erased with a damp cloth. Copy for a new message every other day, is what attracts attention.

Write to us for this great sign

Write to us for this service. You'll be delighted at the way it draws trade to your place. It sells goods. It makes people talk. Newspapers and magazines have quoted the "Boy's" witticisms. Preachers have used them as a text for sermons. Actors have built laughs out of them. Write to us today for our proposition.

EN-AR-CO products build success like the "Boy and Slate" build laughs.

The National Refining Company

1058 Rose Building, Cleveland Ohio

THE NATIONAL REFINING COMPANY 1058 Rose Bldg., Cleveland, O.

Please send me full detailed information as to your "Boy and Slate" signs and other En-ar-co advertising helps.

Name.....

Address.....

City..... State.....

I now sell.....oil

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 29.)

extent of skipping a few inches of the seam.

There seems to be no fixed rule by which every welder can tell the exact amount to spread the sheets. As has been stated, a good deal depends upon the individual ability of the welder. If he is a novice, or is naturally slow, he will have to separate the sheets more than if he were a

angle a little. These things will become instinctive as the welder gains practice.

In relation to manipulating the filler rod, he again has the choice of several methods and should select the mode best adapted to his capabilities. He may work the flame and filler together along the seam; he may follow the filler with the flame; or he may work the flame ahead of the rod. It is an open question which is best. Probably the commonest form is where the filler is followed by the flame.

while the spread of the sheets should be closing fast enough that there will be no gap where the melting is occurring.

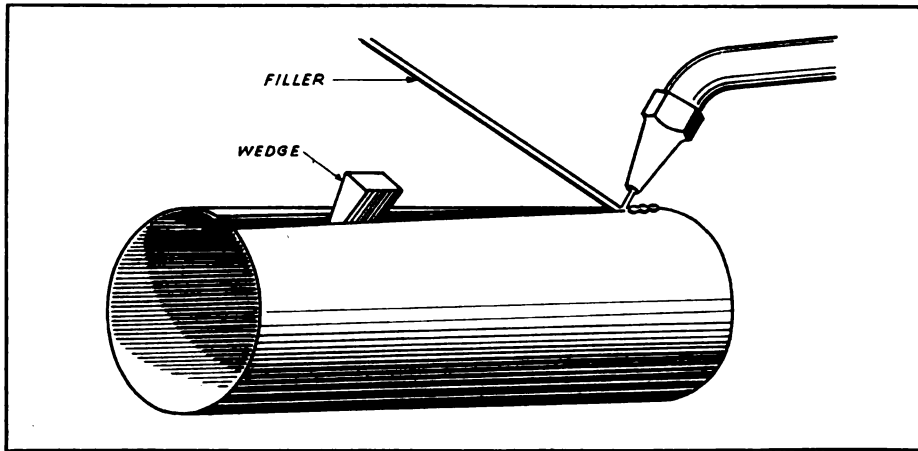
In the ripple method, the filler is manipulated so it will deposit bits of metal one against the other in small waves. This is done by pushing the end of the filler against the drop already congealing and then drawing it slightly forward as it fuses, at the same time dipping the hand holding the filler gently downward. Each wave is but a continuation of the previous ones.

The flame is kept in touch with both the filler and the sheet metal, crossing and recrossing both, always working a little ahead to pave the way and always influencing the shape of the ripples by its force.

In manipulating the flame the operator should try to make its movements easy and natural—that is, he should not be so anxious to keep the flame in motion that he obtains a jerky movement. The positions should, in effect, slide from one to the other deftly and easily, likening it to the free movements of an artist. In this, he will find that a little grip upon the torch is better than a death grip.

The flame should be allowed to do its work and not be forced to do it. If the novice will let the work become instinctive, instead of trying to follow every suggestion to the letter, he will no doubt become a better welder.

(Continued next month.)



Method of Separating Sheet to Prevent Distortion During Welding.

rapid, skillful workman, but in no case should the spread be less than an eighth of an inch per foot—and from that up to a half-inch per foot in some grades of metal.

A fair average, perhaps, would be a quarter of an inch per foot. For instance, if the sheets are three feet long, the width at the widest end of the spread would be three-quarters of an inch, or, in other words, the sheets would be spread apart three-fourths of an inch at one end while at the other they would not quite touch. Care should be taken to see that they lay at the same angle from a central line, otherwise the whole thing will be out of shape when welded.

Now that we understand something about the difficulties to be encountered in welding sheet iron, let us take up the subject of filler metal and flame manipulation. In the first place, there is probably no better filler metal for this class of work than common wrought iron in the shape of round rods of varying lengths and diameters. This is the so-called Swedish or Norway iron.

The diameter of the rods is of importance and whenever possible the operator should select a filler rod of a diameter corresponding to the metal thickness of the sheets. If the metal is one-eighth of an inch thick, the rod should be one-eighth, and so on.

This is the rule up to a certain sheet thickness only, and it is not arbitrary since a good seam may be made with a rod a trifle over or under size; the operator has only to speed up or to slow down the melting or change the flame

But whichever method is utilized, the rod is kept in constant contact with the melting weld. It is not allowed to pile up or drip onto the weld.

There are three ways in common use of applying the filler metal. In one the metal is melted in a smooth ridge along the seam. In another it is melted in flat pools level with the surface of the sheets. The third is what is termed the ripple weld, where the filler is applied in a series of symmetrical waves or ripples along the seam. Again it seems to be a matter of personal opinion which is best.

The first is made by bringing the flame close to the end of the sheets and revolving it in decreasing circles until the edges of the sheets melt together, at which time the filler is introduced and a portion of it deposited by a twisting movement of the rod.

Without removing the rod, it is lowered and pulled along the seam in conjunction with the flame, which action tends to lay a ridge of new metal along the seam. The flame must work enough head to keep the edges of the sheets molten ready to receive the filler.

If the second method is employed, the rod is held more upright and twisted into the melting edges of the sheets to spread out pool-like and join the sheets. Of course, the flame is revolved over the starting point until it melts, before introducing the filler. Then it is either revolved or is moved in a short arc back and forth across the seam to keep it melting. In connection with a twisting, churning motion of the rod, the force of the flame is utilized to smooth the weld. Mean-

OVERHAUL JOBS—THE SERVICE BASIS?

(Concluded from page 23.)

Just why this is, I cannot say for every single mechanic, who has a good tap and die assortment, tells me that he uses them as much as any tools he has in his kit. Maybe they get along without them, not knowing their real value in the shop, or, in some cases, it may be because of the original cost. We must judge a tool by its earning value and, when we do this, there is not a single tool in the shop that has an earning value to equal a complete assortment of taps and dies.

During my trips through the country, I have found many old mechanics who have made taps and die sets and think they are just as good as those obtained from tap and die manufacturers. Next month I have an interesting story for you along the line of "Make 'em or Get 'em."

Omaha Accessory Show in Connection With Automobile Show.

Clarke G. Powell, manager of Omaha's 16th annual automobile show, March 14 to 19, inclusive, has announced that an accessory show will be held in connection with the show of passenger cars and trucks. There has been a demand for an accessory show from many quarters each year, but it was impossible to arrange in the past, due to the lack of space.



THE
Gardner TWO-STAGE **Air Compressor**

Embraces

THREE IMPORTANT FEATURES

1. Method of Oiling

The Gardner lubrication system is more even, more thorough. It oils efficiently and guarantees pure, oil free air.

2. Efficient Compression

In the Cylinder of the Gardner Air Compressor the piston at the end of the stroke has only 1/64 of an inch leeway. This means direct compression—no waste motion. It means that there is no clearance whatever in the suction and practically none on the discharge.

3. Dependable Organization

60 years of service, 60 years of satisfaction to thousands of customers, stands behind the Gardner Air Compressor built by the Gardner-Governor Company.

Send for valuable data and interesting information showing just how the GARDNER AIR COMPRESSOR can increase your garage business.

Address

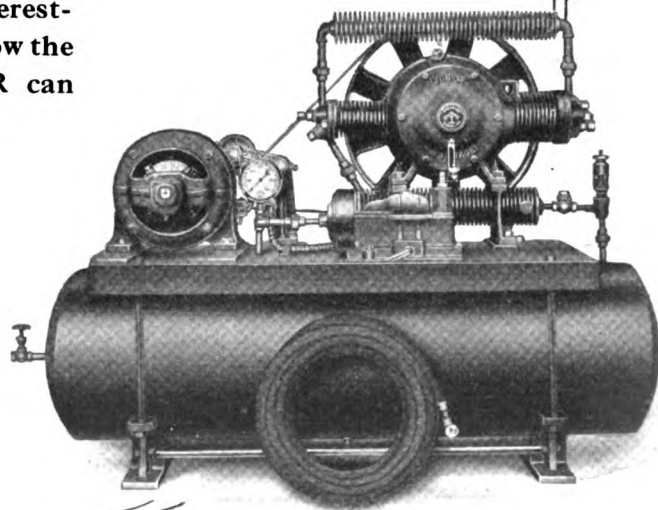
C. A. DICKERSON

Distributor

614 Fisher Building

CHICAGO

ILLINOIS



Accessories—Dealers' Key to Profits

Aro Signal Helps to Solve the Traffic Problem.

"Mr. Lewis, haven't you often, when in a hurry to get somewhere," asked Johnson the garageman of his customer, "wished for some means of reading the mind of the driver in front of you? Which way he is going to turn, you have asked yourself. You felt if you knew you could gain one or two of those precious minutes you so much needed. Well, you don't need to be a mind reader, now. Your problem is solved simply and effectively, if he uses the Aro signal."

The device which Johnson was explaining to his customer consists of two aluminum arrows, encasing 20-candle power nitrogen bulbs and faced with imported ruby glass, making an effective signal day and night. Armored wire is used throughout for the wiring.

Placed on the front and rear fenders of a car, drivers of cars coming from any direction will know at a glance just what the driver of the car carrying the signal intends doing. Pedestrians feel kindly toward the users of the Aro because it means safety to them—they know whether to stop or proceed.

The Aro is as effective in operation as the electric light in a home. It has no moving parts, no complications, and has but one purpose—to tell those in front or behind in a car, in a positive yet polite manner, when the car will be stopped, or turned to the right or the left.

Any competent mechanic should be able to install this signal in two hours' time. It can be applied to any car with battery system, and also to Ford cars using magneto for lighting.

A convenient double push switch is placed on the steering post, the left button operating the left lights and the right button the right lights.

For further particulars concerning this interesting new device, write W. J. Smith Co., 1834 Broadway, New York City, and mention the American Garage & Auto Dealer when writing.

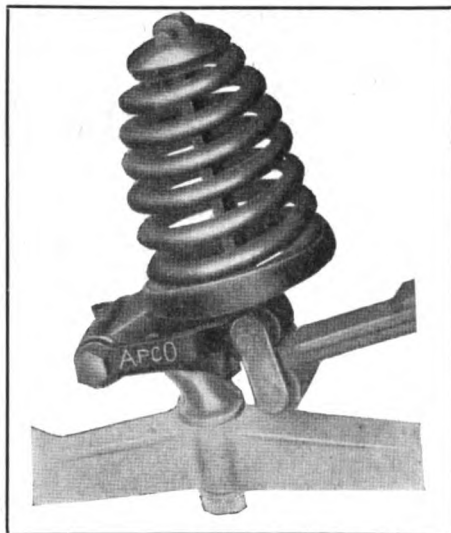
When a Customer Sees the Apco, He Says, "Just the Thing!"

The Apco Mfg. Co. made its first shock absorber in 1911 and since then, as it states, has been constantly striving to produce "the best."

In its 1921 model, now ready for the trade, the original side-link construction is retained preventing disastrous side sway and the heavy spring so hung that the slightest pressure on the mudguard brings it into action.

Malleable castings, hardened steel bushings, adjustable bolts, black enamel finish

and easy installation are a few of the features of the new shock absorber. The Apco company's principal claim is "Every road a good road" and its guarantee of "All-Ways Right" is back of each device.



Latest Apco Shock Absorber.

For more complete details write to the Apco Mfg. Co., Providence, R. I. When writing don't forget to mention the American Garage & Auto Dealer.

Motor Repair Without Acetylene Welding Equipment.

Products are now selling on the market, with which, it is declared, permanent and thoroughly satisfactory repairs may be made to automobile motors and metal parts, as well as aluminum and cast iron castings, without the aid of the acetylene welding equipment.

These products, while virtually a solder,

have in them physical properties which it is said the average metallurgist has not thought possible to combine.

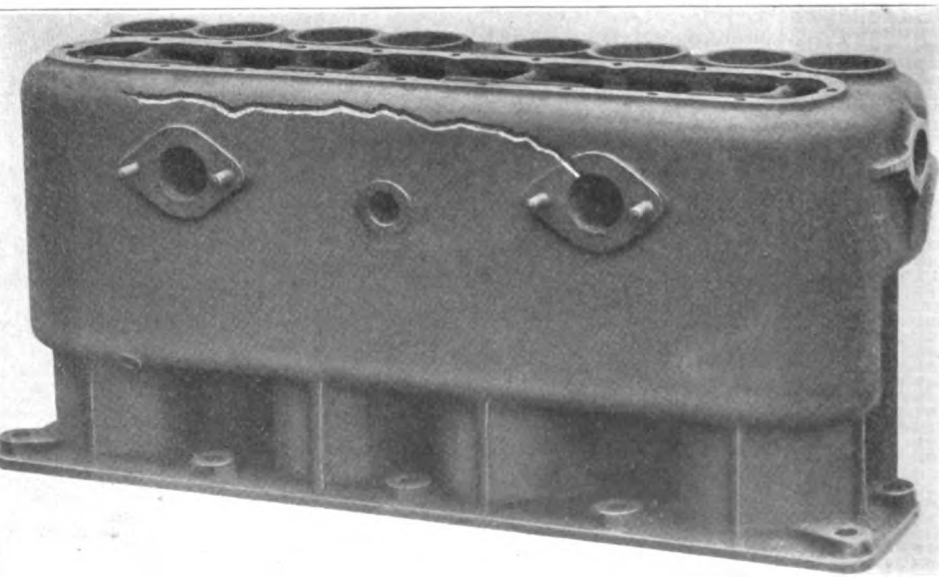
However, it will be of interest to the reader to know that the "F. A. A. aluminum and cast iron Mend," are spoken of as perfect substitutes for acetylene welding and have been used for a number of years in making repairs on defective or scored cylinders, crank cases, and many other parts made of aluminum or iron, which have heretofore been considered a job for the acetylene welder.

Where such equipment has not been available, these parts have often been discarded for new at a great expense to the owner and, incidentally, to the garageman who was unable to make the repair at the critical time.

The entrance of these products on the market has reversed the small-town garage proposition and gives the motorist an opportunity to further reduce his overhead in repairs and maintenance of his car.

The Aluminum Mend is claimed to make virtually a welded repair and can be used with thoroughly satisfactory results on all aluminum parts, particularly broken crank cases. The application requires only the use of a file, metal scraper or wire brush, and a blow-torch.

First, the parts to be repaired are filed clean; then heated with the blow-torch. After applying a small amount of the Mend and rubbing it in well with the wire brush, the parts are ready to be placed together and all cracks and crevices filled with the Mend. After cooling, the repair is filed off and polished, leaving a finished job of the same color as aluminum and much stronger.



Crack in Water Jacket Chiseled Out to Allow Mend to Have Hold of Casting.

Non Freezing "PEP" Non Drying GRINDING COMPOUND



has set a new standard in valve grinding

The illustrations give you some idea of the results obtained by "PEP" as compared with an oil mixed abrasive.

Water-mixed "PEP" not only does incomparably better work but does it much more quickly and profitably. "PEP" seats a valve in **one operation** because only **one grade** of abrasive is required for cutting and finishing. The job is done in **half the time** ordinarily required—and at half the cost.

Your mechanics will like "PEP" because it is clean and convenient to use. Only a water dampened cloth is required to wipe the valves before and after grinding.

Try "PEP" once and you will always use it. You can thoroughly test "PEP" at our expense by sending the coupon to your jobber. Mail it today.



Worcester Abrasive Co.

1662-1664 Broadway, New York City

Refer to list of jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book"

FREE

Your Jobber wants to sell you the BEST Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a half-pound can (value \$1.00 list) under the following conditions. Clip this coupon and send it to your Jobber with request that he O.K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

WITH YOUR JOBBER'S O. K.
ON THIS COUPON WE WILL
SEND YOU A HALF-POUND CAN
OF PEP (Value \$1.00 List) FREE

(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a half-pound can of PEP (value \$1.00 list) for testing purposes. I will let you know the results of this test.

FREE

JOBBER'S O. K.

Please send the party whose name is written above, a half-pound trial can of "PEP."



1662-1664 Broadway WORCESTER ABRASIVE CO.

New York



In the case of a cast iron mend, the process is somewhat reversed, and, in a way, more simple. Take, for instance, the cylinder block shown in the accompanying illustration. The water jacket has been cracked almost the entire length of the block and, as shown, has been chiseled out to the depth of perhaps $\frac{3}{8}$ by $\frac{1}{4}$ -inch in width, in order to allow the Mend to have hold of the casting.

After this has been accomplished, muriatic acid cut with zinc is used to cleanse the surface, and then the Mend is applied with an ordinary copper soldering iron. A repair made in this manner will expand and contract with the casting, thus making a permanent repair, it is declared. In the repair of a scored cylinder, it is stated, that no machining is required, thereby eliminating the replacing of other parts.

The Iron Mend is strong and malleable and sufficiently hard to stand machining of any kind without gumming the tool. Full assurance may be had of a permanent and secure job when the parts are assembled.

F. A. Albertus, of F. A. Albertus & Co., Milwaukee Wis., has been engaged in making motor repairs similar to the jobs described for a number of years, and will gladly give such information as he has been able to collect in his experiences to any repairman seeking further information regarding these processes. Mention the American Garage & Auto Dealer when writing.

A. Schrader's Son Puts Up "Special Package" for Your Customers.

The difficulty found by a great number of motorists in replacing valve caps lost in the process of changing or pumping up tires has caused the firm of A. Schrader's Son to put up five of these very essential valve adjuncts in a small metal box, which can be sold to your customers at a nominal price.

That this handy little package will fill a long-felt want is shown by the fact that in a recent survey of 1,309 cars parked along Broadway, New York, valve caps were found to be missing on no fewer than 455 valve stems. This means that 455 tires were being run on with the valve stem open to the admission of dirt and dust and mud.

Such abuse of a tire valve is nothing short of criminal. A valve may be ever so perfect, but it cannot be expected to remain so if all kinds of foreign matter are permitted to enter it. Now that spare valve caps are made easily accessible, we may look to see this sort of mistreatment decrease, if not altogether disappear.

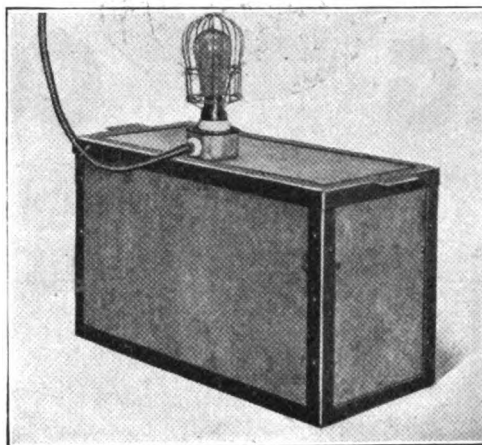
Write for further particulars to A. Schrader's Son, Brooklyn, N. Y. Mention the American Garage & Auto Dealer when you are writing for further details.

Present Your Establishment With a Hyrate Electric Oven.

Designed to produce practical results in saving time and labor, as well as breakage

for battery tear down, is the new electric oven made by the Service Station Supply Co.

The manufacturer claims that this oven has the distinct advantage that no labor is required while the battery is being heated not only rapidly but fairly and evenly, and without burning or charring the tray or rubber parts. Thus the danger from explo-



Hyrate Electric Oven for Battery Work.

sion of igniting gases in the cells is eliminated.

The Service Station Supply Co. also claims that the Hyrate electric oven will do the work of several steam ovens in actual output for there is no steam gage to watch, or work to do in filling the boiler. With this oven, the external solid parts of the battery are thoroughly heated before the solution rises in temperature so that plates are not injured by the heat.

The Hyrate oven is manufactured in two types, one for from 110 to 125 volts, and the other from 220 to 250 volts. It will operate on either direct or alternating current.

A handle is mounted on either end of the oven so that it can be tipped either way to inspect or remove the battery. The heating units are carefully calculated to supply the maximum heat that can be used without setting fire to the sealing compound, or injuring the rubber parts.

For drying armatures, field coils, and for other work in electrical repair shops, the company recommends it. For further particulars, write to the Service Station Supply Co., 30 E. Larned St., Detroit, Mich. When you write, don't fail to mention the American Garage & Auto Dealer.

The New Stiles Liberty Siren Warns Without Frightening.

No matter how loud the rattle and the rumble of traffic, the Stiles Mfg. Co. guarantees that its Liberty siren will penetrate above the noise, for it sounds its melodious signal in a way that commands attention and gets it.

The device attaches to the exhaust manifold under the hood of any car or truck. It operates by the simple pull of a cord, attached to the dash or steering wheel col-

umn. And the operation costs nothing. The siren does not interfere with the mechanical operation of a car in any way, it is claimed.

Sixteen melodious musical notes can be played on the Stiles Liberty, and the manufacturer guarantees that every siren is strong and durable.

For trade prices and more complete details, dealers should write to the Stiles Mfg. Co., 4423 Gravois Ave., St. Louis, Mo. Mention the American Garage & Auto Dealer when writing.

Your Customers Can Start the New Year Right with a "Gilman."

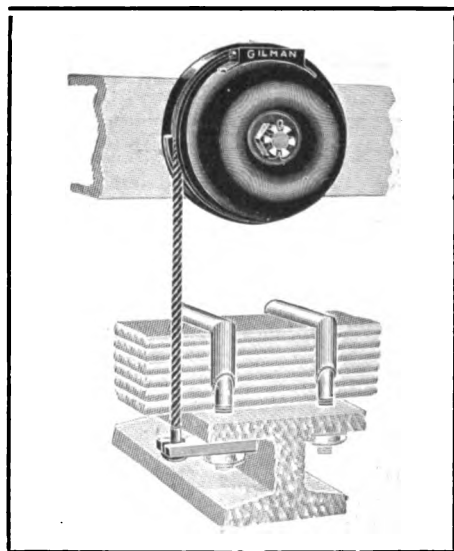
Impress upon your customer's mind that there is always room for one more good resolution in these days of economy. That is to buy something for the car that will not only prolong its life, but add to the comfort of its passengers—a Gilman shock absorber.

This new device, placed on the market by the Gilman-Davis Mfg. Co., smoothly and positively controls the recoiling movement of an automobile spring the entire distance of its travel, without harsh checking or snubbing at any stage.

It is said to allow a car to ride upon its springs without restricting their downward movement. It eliminates the disagreeable up-throw which breaks the spring, jolts the car and jars the occupants.

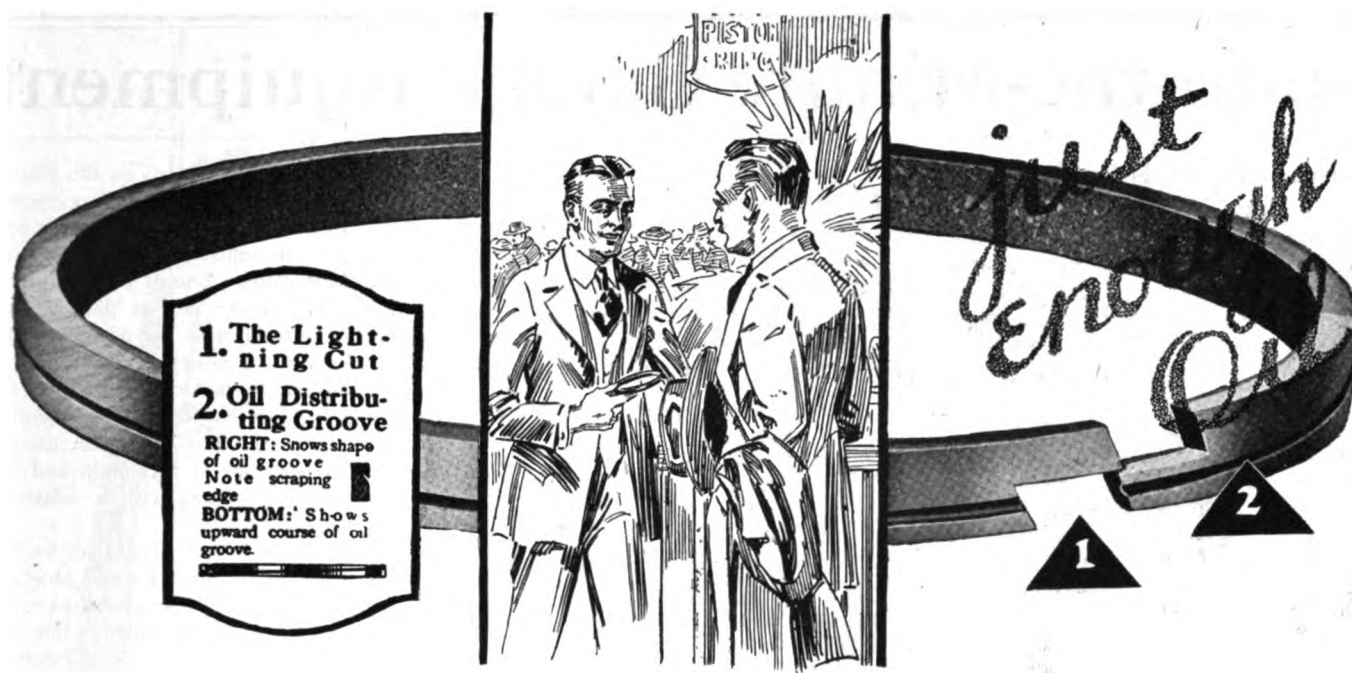
This shock absorber can be adjusted with a screw driver while it remains upon the car.

Handsome and compact in design it will meet with approval. Its working parts are completely enclosed. Its attachment is simple. One type of fitting, applicable to fully 90 per cent of all cars, makes it ideal for jobbers and dealers to stock.



Screwdriver Adjusts This Shock Absorber.

For further details write to the Gilman-Davis Mfg. Co., 224 S. Michigan Ave., Chicago. And—mention the American Garage & Auto Dealer when writing.



At One of the Recent Shows a Piston Ring Demonstrator Said:

"Our ring is not cut with an oil groove for the very good reason that an oil groove collects tiny particles of carbon, clogs up and does not serve the purpose for which it is intended.

Of course we did not expect this young man to make an exception of the General Lightning Cut Ring. And he had hit the nail squarely on the head so far as some oil-grooved rings are concerned.

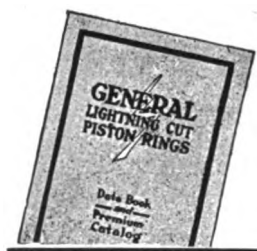
Our satisfaction came from the unconscious admission that if an oil groove did not clog, *it would serve the purpose for which it was intended.*

We might have told him about

the Wandering oil groove and patent No. 1354287 which prevents the oil grooves of other rings being cut *up, around and down* to the joint.

That the course of the Wandering oil groove carries the tiny particles of carbon *down hill*, through the lower part of the joint and into the crankcase. That, instead of clogging, this Wandering oil groove actually lubricates both the ring and the wall and minimizes friction.

That its scraping edge saves gallons of precious oil. That the General Lightning Cut Ring is of concentric shape and why. That it is individually cast and *not* sliced from a pot casting.



GENERAL UTILITY COMPANY

1326-28-30 Ogden Street, Philadelphia, Pa.

Export Department: 17 Battery Place, New York City

General LIGHTNINGCUT PISTON RINGS

Now 50c
and up

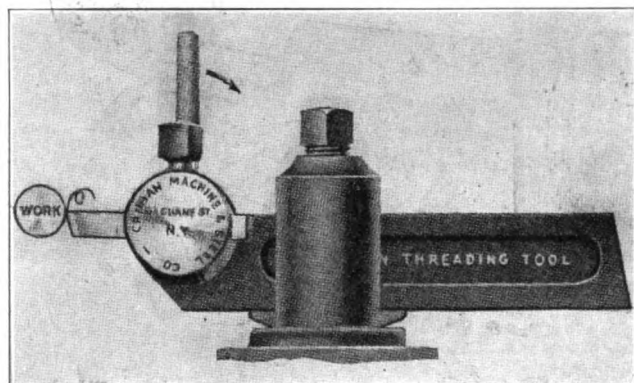
Now 50c
and up

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Up-to-the-Minute Garage Equipment

Efficient Lathe Tools for the Up-to-Date Toolmaker.

The watchwords of the present day are efficiency and economy, and in line with these trends, the Cruban corporation is offering a number of excellent lathe tools which will undoubtedly be of interest to all repairmen or garagemen having lathes.



Cruban Simple Threading Lathe Tool in Operation.

One of these is the Cruban rapid threading tool, which is built to cut any size or style of thread accurately and rapidly. It is said to be 50 per cent faster than any single-point threading tool. The illustrations show the simplicity of its use, a skilled operator not being required.

It is compact and sturdy, the cutters being made from high speed steel. Either straight shank or left-hand offset shank and drop-forged wrench can be furnished. If parts wear, it is self-adjustable. All errors due to manipulation of the cross-slide are eliminated.

Other claims made by the manufacturers for this tool are that it will reduce the threading cost 50 per cent, keep the machine running constantly, will prevent gouging of tool, eliminate waste motions, reduce tool costs, and prevent spoiled work.

Another interesting tool of this group is the Cruban multiplex threading tool, which embodies not only the desirable features mentioned for the rapid threading tool but also other features which are new and unique. It is a simple, rapid-action lathe tool with six cutting knives mounted on a turret, for accurate quantity production of taps, screws and threaded parts.

Each knife is micrometrically adjusted and is set so that each succeeding knife takes an additional depth of cut. One complete rotation of the cutter turret should be sufficient to cut any thread up to No. 12 pitch without disturbing the cross-slide.

At the end of a cut, a slight pull of the pin handle, which is of the same type as

that on the rapid threading tool, towards the operator, disengages the cutting knife from the work. After the machine has reversed, the pin handle is again tripped by pulling towards the operator and the following knife is automatically in position for the next cut. Each knife is held firmly in position by a locking screw at the bottom of the knife. When the knives become dull, they are removed by loosening the locking screw and removing the side plate.

The Cruban rapid internal threading tool is built to cut any size internal thread accurately and rapidly. When the end of the cut is reached, a small lever is thrown up, without disturbing the cross-slide, and while the machine is reversing, the tool can be set for the next cut.

Write the Cruban Machine & Steel Corp., 63 Duane St., New York, N. Y., for further details, and be sure to mention the American Garage & Auto Dealer.

The New Oil Gas Burner that Makes the Blue Flame.

A new and novel invention for burning oil in place of using small coal fires and gas

burners is now being placed on the market by the Hauck Mfg. Co. Its new oil gas burner is said to convert ordinary kerosene or coal oil to a perfect combustible gas, producing a clean, blue flame. One of the many features of this burner is that flare-back is entirely eliminated, also the flame is absolutely odorless and noiseless.

This burner is particularly suited for operating in close quarters where absolute safety is required. The oil consumption is three pints per hour at maximum and but two pints are consumed with a relatively smaller size flame.

The amount of heat generated by the burner, which produces 141 small blue gas flames and which can be increased until these flames increase and converge into one large triangular flame six inches in height, makes it a very practical outfit for cooking and heating purposes, baking and drying ovens, in fact for any place where a clean, noiseless flame is desired.

The outfit consists of a five-gallon steel tank with fittings for holding the liquid fuel, equipped with a hand pump for forcing the oil to the burner by means of air pressure at 30 lbs.; six-foot length of



A New Oil Gas Burner.

copper oil tubing and the burner proper. The burner is 14 ins. long by 6 ins. wide and 5 ins. high, thus it can be readily adapted to any standard gas stove hot plate.

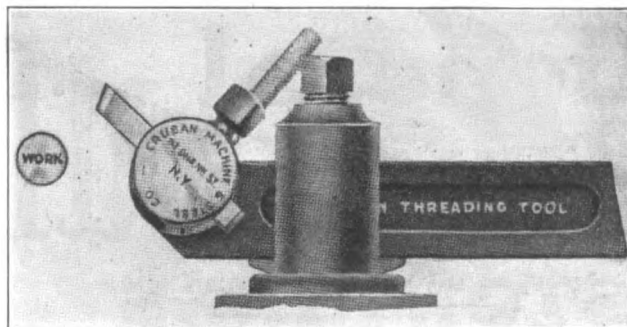
For more definite details write to the Hauck Mfg. Co., 126-134 Tenth St., Brooklyn, N. Y., mentioning the American Garage & Auto Dealer.

"Pep" Means Speed in Grinding. Try It in Your Shop.

When anybody has "pep," he can start and finish anything. And when a garageman uses "Pep," the new grinding and lapping compound, the same thing is true, for "Pep" starts and finishes any grinding job in one operation.

The Worcester Abrasive Co., manufacturer of "Pep," defines perfect grinding as follows: "A grinding job where two or more surfaces have been ground together

A Slight Pull on the Handle of the Cruban Threading Tool Disengages It From the Work.





Your Profits Guaranteed

THE Harvey Sales Plan *Guarantees Your Profit* just as surely as we guarantee Harvey Springs.

Harvey quality enables us to guarantee Harvey Springs against sagging and breakage.

The Harvey Sales Plan guarantees your profit against sagging and lagging.

You cannot carry an overstock of replacement springs when you buy the Harvey Way. No need to have *dead* dollars lying on your shelves for years.

With a balanced stock of Harvey Springs, you will find that you can satisfy your customers without waiting to order springs. You will have quicker turnover and larger profits.

How do we eliminate all chance of loss from overstock and springs that do not move readily? It's no secret. We'll be glad to give you the full details of the Harvey Selling Plan and the Harvey Book—a complete guide for ordering any of the 1500 Harvey Boltless Springs—and a guide to bigger profits in the spring business.

Harvey Spring and Forging Co.
1042 17th Street Racine, Wis.

Harvey
RACINE
BOLTLESS
AUTOMOBILE
SPRINGS

Easy Riding — Guaranteed

to the closest possible fit without scratching or ringing, with all of the abrasive particles cutting equally fast and withstanding the friction evenly, where only the fuzz of smooth, perfectly ground sur-



"Pep" Comes In Different Size Cans.

faces show under the microscope—but this job must be done in the least time."

"Pep" is water-mixed. The manufacturer states that this allows the particles of abrasive perfect freedom of movement and thereby accelerates the friction and completes the grinding in "less than half the time."

This compound combines in one grade, states Worcester Abrasive Co., the cutting and finishing grades of oil-mixed compounds and eliminates the labor expended in changing from coarse to fine grade.

It is both cleanly and convenient to use. Only a water-dampened cloth is required to wipe the surfaces to be ground. No kerosene or gasolene is necessary. Pep is guaranteed by its manufacturer to neither dry out nor freeze. It is made in three grades—one for automobiles—one for brass—and one for railway and other purposes.

Write for additional details to the Worcester Abrasive Co., 1662-64 Broadway, New York City.

When writing, don't forget to mention the American Garage & Auto Dealer.

No Waste Motion—Gardner Gives Efficient Compression.

New business just naturally gravitates to the garageman who keeps abreast of the times with modern and efficient machinery and equipment. As a part of this equipment, of course, a first class air compressor is important.

Among the interesting features attributed to the Gardner two-stage air compressor by its manufacturers are:

That the method of lubrication is such as to guarantee clean air, free from oil, the oil being distributed drop by drop so as to give just enough and not too much for efficient operation.

That the action is instantaneous, with no waste motion or clearance. It is said that in the cylinder itself, the piston at the end of the stroke has only 1/64th of an inch leeway.

That, in view of the fact that the Gardner air compressor is the product of a 60-year-old organization, it is important to remember that the company will be ready to serve you in the replacement of apparatus or parts ten years from now just as it has served its customers for the past 60 years.

The Gardner air compressor is built under one roof; as the manufacturer puts it—"built, not assembled." The Gardner Governor Co. has its own engineers, draftsmen, pattern shops and foundries, and each detail of construction and mechanism of its air compressors is said to be of the highest type.

C. A. Dickerson, Fisher Building, Chicago, is the sole distributor of the Gardner two-stage air compressor and will gladly supply complete information regarding them. Write him for further details, and be sure to mention the American Garage & Auto Dealer when you write.

Free Air Profitable? Certainly!

Jones Tells Why.

"Say, Jones," remarked a bystander as the last car stopping for air drove away from the garage, "Isn't it something of a nuisance to be supplying all this service for nothing?"

"Nothing?" laughed Jones, "Why man, that's one of the best business getters I have. I'll tell you why. I used to use the same arrangement many garagemen do—a length of hose thrown down haphazard on the dirt of the floor or driveway.

"I've always made it a practice to observe rather closely the attitude of customers toward the general appearance of my place and my methods of service. I believe that is good business. I noticed that people were often annoyed because of the soiled hands and clothing generally resulting from handling the hose picked up from the floor or driveway. It seemed to me that in many cases they left with an unfavorable impression of my place just on that account, so I began figuring on a way to remedy the condition.

"One day I happened in at Smith's, the big accessory shop in Hometown, you know. Smith showed me the Champion air and water stand you see over there. It certainly is a wonder. Come on over and I'll explain it to you."

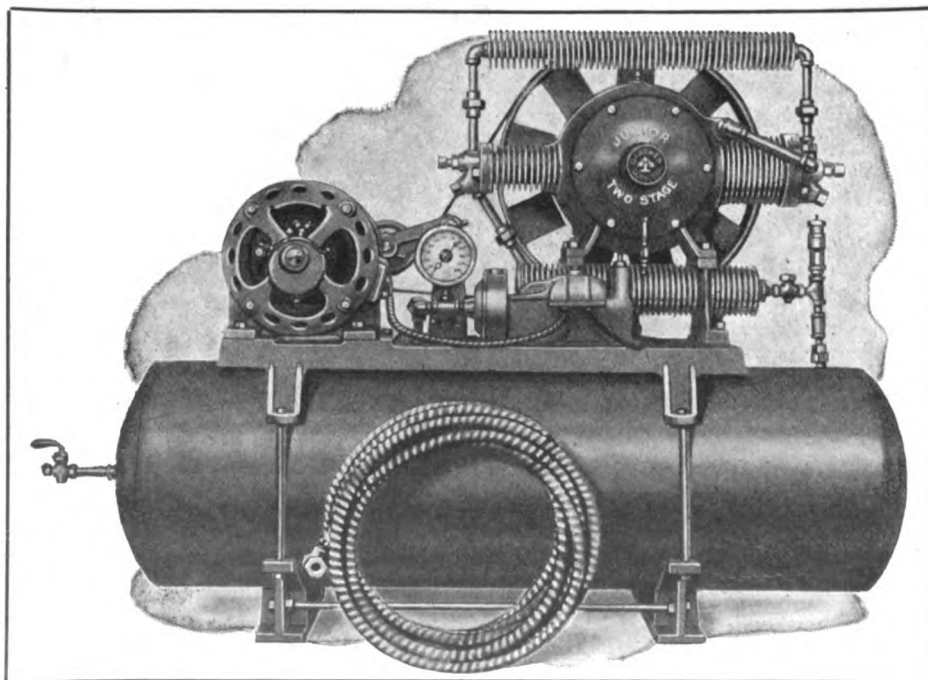
They walked over to the stand and Jones' companion remarked admiringly, "It's a nifty looking article, all right, but I don't get the idea of going to extra expense when you supply the air and water free."

"Well," said Jones, "I'll tell you. You see, in the first place, if you give people what they want, when they want it, and in the way they want it, they are bound to be pleased and often become regular customers. Now, with this Champion air and water stand they get air and water quickly, easily, and without soiling their hands or clothing.

It pleases them and they go away with a good impression of the place in general. In fact, I've had many car owners and drivers tell me that they have gone considerably out of their way just to come here to get the Champion service. Incidentally, as you can readily see, many times they purchase supplies—and right there is another point: It's actually true that folks who rarely bought anything when I had the old service—just seemed anxious to get away as quickly as possible



Champion Air and Water Stand.



Gardner Two-Stage Air Compressor Is Product of 60-Year Old Organization.



The history of the day's business

Every time a sale is recorded on an up-to-date National Cash Register, a complete record of the sale is printed on a strip of paper inside of the register.

This strip of paper is called the detail-strip.

It shows how much business is done during certain hours, or during the proprietor's absence.

It cannot be removed or changed without the proprietor's knowledge.

It prevents the cash drawer being opened without a permanent record being made.

At the end of the day, the proprietor takes the detail-strip out of the register and files it away.

It gives him a permanent, unchangeable history of each day's business.

The detail-strip is only one of the many features which make up-to-date National Cash Registers a business necessity.

RB ★-2.50	-0001
SA Rc 12.00	-0002
RE ★-0.75	-0003
RA ★-1.25	-0004
SE Ch-7.45	-0005
RD ★-0.33	-0006
RD ★-4.25	-0007

RA Pd-0.50	-0008
RD ★-0.89	-0009
RB ★-0.15	-0010
RE ★-5.35	-0011

SA Ch-4.50	-0012
-D NS-0.00	-0013
RB ★-2.23	-0014
SD Ch-3.75	-0015
RA ★-4.08	-0016
RE ★-0.75	-0017
RD ★-1.00	-0018
SE Ch-1.25	-0019
RB ★-5.75	-0020
RD ★-0.47	-0021
RA ★-1.25	-0022

This is a section of the detail-strip. For each transaction it shows (1) whether a receipt or slip was issued, (2) the initial of the clerk, (3) the kind of transaction, (4) the amount, and (5) the number.

Let our representative show you how it will help you make more money.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL
CASH REGISTER CO.
 DAYTON, OHIO.

—seldom leave now without buying something.

"Another important feature is the advertising value of the Champion. Haven't you noticed how that 14-inch electric globe makes my garage stand out?"

"Why yes," agreed the other, "I have noticed that. There's no question but that it attracts one's attention instantly."

"Also," continued Jones, "The stand is not in the way. It is installed at the curb and when not in use in no way interferes with the traffic.

"When in use, the arm through which the air hose passes, is turned down, allowing attachment of the air hose to each of the car wheels and filling of the radiator without moving the car. After filling the tires, the hose is simply released by the user and the arm automatically returns to the normal vertical position, leaving the hose clear of the ground where it remains until again used.

"Both the air and water hose are at all times clear of the ground, particularly so when not in use, thereby protecting the hose and connections, and affording a clean method of filling the tires and supplying water to the radiator. Why, when I used the old service, I was constantly having to replace hose and connections because of their deterioration from wear and damage through being walked and driven over.

"Like all Champion air and water stands, it is equipped with the latest improved automatic air valves, water valves, 300-pound air gauge, Conqueror air hose and Champion patented hose clamps and handle. The base is large and roomy, with door, which makes the installation and connection to the air, water and lighting lines a very simple matter."

"By the way, Jones," asked his friend, "who gets out this device? I've a brother-in-law who is a garageman, and I believe he'd be mighty interested in a thing of that kind."

"It is made by the Champion Pneumatic Machinery Co., 1402 South Michigan Ave., Chicago," answered Jones. "Better have him write for a catalog. He will find a Champion is a real investment, all right."

Last Word on Ignition Trouble Locating and Remediating.

The problem of locating and remediating ignition trouble on the Ford car will be a simple one if the new coil and adjusting instrument now being marketed by the Fairbanks Co. is used.

The coil-test unit consists essentially of two separately-constructed electrical measuring instruments, in a suitable protecting case, with internal wiring and protective device. The instruments used are the best obtainable, and their movements are swung in sapphire jewel bearings. The case is made of three-ply black walnut, and, if properly taken care of, will not warp, get

out of shape, or become loose in its joints.

In general, according to the statement of the manufacturers, the coil test unit is a "Precision Instrument" for saying the last word in the functioning of the Ford ignition coils.

A pamphlet, sent out in connection with the instrument, gives in detail instructions



Device for Finding and Remedy Ignition Troubles.

for its use and suggestions to assist in locating and remediating faulty ignition.

For making adjustments of vibrators, it is necessary to use the M-45 coil-unit adjusting set in connection with the coil-testing unit. In case the contacts are not clean and properly faced off, a special file, which is included in the coil-unit adjusting set, may be used. When the adjustments have been made according to instructions, it is said that vibrators of the coils are in the same mechanical relationship as when finally tested at the Ford plant.

For the electrical test of vibrating, the coil, after being adjusted, is placed in the receptacle in the coil-testing unit, being pushed back sufficiently far that contact is made on three terminals. A three-cell storage battery, or four dry cells connected in series, should then be attached to the binding posts marked "Battery." After the adjustments have been made, a small push button located below the lower ammeter, if pressed, should cause the vibrator to operate properly.

In making the coil test with the magneto, the battery is completely disconnected and one of the binding posts marked "Magneto" is connected. The motor is started in the regular way, using battery ignition. In this way, the magneto is disconnected from the car wiring so that a test may be made on the coil in question without interfering with the run of the engine. After the throttle is adjusted so that the engine is turning over at a speed

corresponding to about 20 miles per hour, if the button below the ammeter is pushed, the coil should operate normally, giving a good spark at the gap and the vibrator functioning smoothly and without any uneven breaks.

The upper ammeter is a specially constructed alternating - current instrument, which, it is stated, will read correctly the current furnished by the Ford magneto in connection with the spark-plug. Arrows on the dial labeled "Coil Test" indicate the current.

The magneto of the model "T" motor is of the alternating-current type, using rotating permanent magnets and stationary field coils for generating the current. The design is extremely simple, exceedingly strong and practically trouble-proof. The magneto consists of 16 magnets and 16 coils and gives a constant current with a frequency and voltage proportionate to the speed of the engine.

It is not necessary to remove the magneto from the car in order to test it. Simply disconnect the magneto terminal wire from the magneto terminal, snap on one clip from the wires furnished with the coil-testing unit and another clip on the magneto terminal post on the transmission cover. Then the switch at the left of the ammeter is thrown to the upper position marked "Mag. Test."

For the test for a grounded cell, the coil assembly is taken from the car, the solder removed from the end of the ribbon winding on the first coil from the ground connection, and a battery connected. The other terminal of the battery is then connected to one of the binding posts marked "Battery" on the coil-testing unit and the third battery terminal is connected to ground. A Ford coil is slipped into the receptacle and if the coil assembly is grounded, the meter will give a reading when the push button is pressed.

Spark-plugs are tested by connecting a six-volt battery to the coil-testing unit, placing a standard Ford coil in the receptacle, and placing the spark-plug to be tested in the clips provided next to the spark-plug.

Commutator and commutator wiring are tested by connecting one of the magneto terminals of the coil-test unit to the magneto terminal on the dash, or on the transmission cover, and touching the other magneto terminals successively to each of the commutator terminals.

For further details concerning this instrument, write for Fairbanks Co., New York City, or any of its branch offices.

Paragraphs.

TEMPLETON, KENLY & CO., 1020 S. Central Ave., Chicago, appreciative of present conditions in the automotive field, have announced a reduction in the prices of their No. 36 and No. 38 Simplex automobile jacks. All Simplex prices are guaranteed until April 1, 1921.

Our Bearing and Lubricating Experts Are at Your Service

to assist you in any bearing troubles. Ship us one by parcels post—one of your own bushings—and we will treat it and return it next day without cost to you. Test it on your own work. We guarantee a saving of 80% to 90% in your lubricating oils on any service.

Designing
Developing
Detailing **OF**
Delivery

Experimental Work and Models for inventors and others.

Air and Ammonia Compressors, Tractors and Accessories, Automotive Trucks, Power Transmission, Clutches and Gearing.

Internal Combustion Engines for any fuel from crude oil to gasoline, either two-cycle or four-cycle, and for any purpose from farm to airplane engines.

Filtering Systems for lubricating oils or gasoline piping.

Labor saving devices.

Concrete Tanks for any liquid.

Water System and Power. Manufacturing.

NOW IS THE TIME

to fix up your old engine

We specialize on engine work, particularly two-cycle marine, while laid up for the season

Peerless Engineering Co.

EXPERT ENGINEERS

Lock Box 1472

Cincinnati, Ohio

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

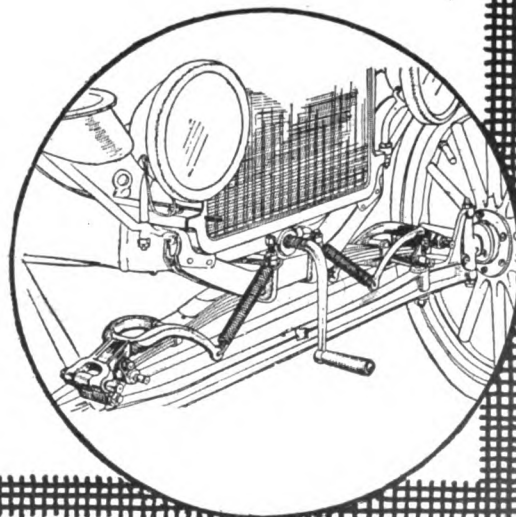
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.

In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Here and There in the Motor World

Optimism Backed With Safe, Sound Business Judgment.

"We are optimistic, but we are going to back up that optimism with safe, sound, business judgment."

This statement was made by J. H. Barringer, first vice-president of The National Cash Register Co., in a talk at a recent convention of the 100 Per Cent Club of that organization. More than 800 sales representatives from every big town and city in the United States and Canada were in attendance.

"Things are getting back to normal," continued Mr. Barringer, "and now is the

The convention was called to study the problems of merchants and how to meet them. Considerable time was devoted to discussions on store systems and service to merchants. Two new models of cash registers were also announced.

C. E. Steffey, general sales manager, declared that "the changing conditions through which we have been passing are like an acid test. We will be all the better for them. Business in 1921 will be better than it was in 1920. All that is necessary is to be on the job earlier, work longer, and produce more."

One of the greatest object lessons of the

When the curtain on the stage rolled back for the last time, the stage setting showed a stream representing the readjustment period.

"How are we going to get across in 1921?" asked Mr. Barringer.

"I'll show you how," replied F. B. Patterson as he leaped to the stage and pulled a lever. Immediately the leaves of a draw-span bridge were lowered, the bridge representing the things learned at the convention. As the two sections met, pandemonium reigned. A great wave of salesmen surged forward, singing "We're Going Over," and headed by officers of the company, crossed the bridge in a final triumphant pageant.

The spectacular ending emphasized the fact that the country has passed over the reconstruction period, that sound conditions are here, and that 1921 will be a surprisingly good year for business.

The M. W. Dunton Company in New and Larger Plant.

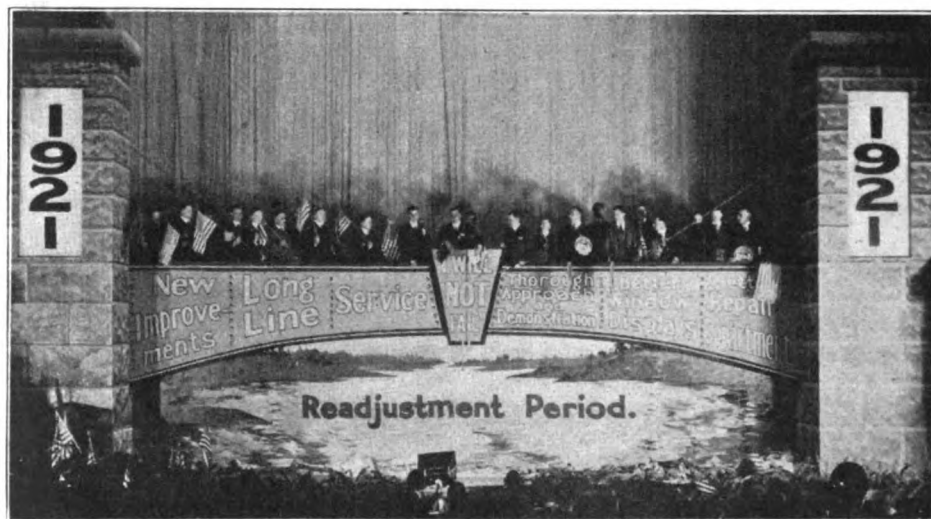
From a very modest start—merely desk room—until today it occupies a large factory located in the heart of the manufacturing district of Providence, R. I., is what has been accomplished by the M. W. Dunton Co., manufacturer of Nokorode soldering paste, in the few years it has been in business. This is a record of which any firm may be very proud to have.

In announcing its removal to the new and more commodious factory, the M. W. Dunton Co. advises that it will have approximately 20,000 square feet of floor space with elevator, large steam capacity and everything else to assure prompt and efficient production. In this new plant, the Dunton company proposes to install the latest kind of labor-saving, modern machinery, systematically arranged so that volume production of Nokorode soldering paste and other specialties will be assured.

The M. W. Dunton Co. justifiably points with pride to the fact that numbered among its present customers are well known corporations specializing in every conceivable kind of business. The company never suspected that the day would come when it would sell Nokorode soldering paste in ton lots to single customers—but in the last three or four years, many such orders have been filled.

Ample provision has been made so that if the present manufacturing quarters prove insufficient, an addition to the present building can be speedily erected. In its new location the company will be able to make prompt transportation deliveries as it is not far distant from several important railroads.

"It was our business during the last three years that made us realize that we



How 100 Per Cent Club of National Cash Register Co. Intends Crossing 1921.

time to plan for the future, and go forward. Good hard work is needed to bring about better business. The strength of this organization is in meeting conditions as we have always met them—with confidence and courage."

B. C. Forbes, editor of Forbes Magazine, and financial writer of national prominence, gave an interesting talk on business conditions. "Almost every fundamental condition in this country is making for sound, healthy, solid prosperity," he declared. "Whereas one year ago things looked pretty black, now one can look ahead and enunciate a message of optimism and encouragement."

Mr. Forbes predicted that money will very shortly get cheaper, and that 90 per cent of our financial and industrial troubles have passed.

That the business outlook is bright was the opinion of Dr. E. J. Edwards, well-known financial writer, whose articles appear daily in many newspapers throughout the country under the name of "Holland." "You cannot have such stupendous crops as those produced in this nation, and have real stagnation," said he. "Look to the future with confidence."

entire week was given when J. H. Barringer used the company's bootblack to emphasize a big selling idea to the men.

Several salesmen had complained it was impossible to secure their quota of business from their territories—that they needed new ones. Then Mr. Barringer leaped to the stage.

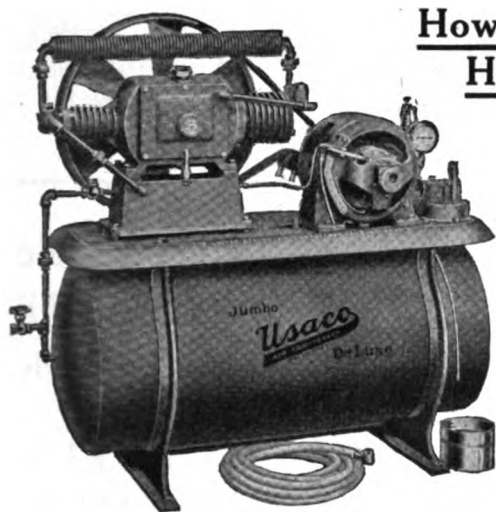
"I'm going to stop this convention to get a shoe shine," he shouted. "Call in the bootblack."

Every one gasped in astonishment. It had previously been stated that the convention was costing the company \$250 per minute.

When the busy little shine artist had finished his work, Barringer told the story of three bootblacks. Two of them had been hired before the present man came on the job. They failed to make the \$4 per day guaranteed by the company.

"But this bootblack," he continued, "with no more prospective customers than the others had, with no more territory to cover, makes more sales—and earns three times as much money as the others did. It's not the territory that counts—it's the man!"

The most spectacular feature was reserved for the close of the convention.



The **Jumbo De Luxe** is the latest Usaco achievement. While comparatively new to the trade, it has passed through gruelling service in the factory and in the field. It is a proven compressor with the same fully automatic features that have made the other Usaco De Luxe models famous.

The Jumbo has greater capacity than the Giant and is offered to the trade to meet the ever growing demands for reliable tire inflating service.

With the Jumbo now in the field, purchasers can select from five De Luxe equipments in either stationary or portable types.

How Much Time? How Much Experimenting? How Much Redesigning? How Many Thousands? To Perfect a Really Successful Air Compressor?

Before a mechanical device is perfected and ready to perform dependable and reliable service, thousands of dollars must be spent in experimentation; parts must be redesigned; new ideas incorporated; and changes made here and there to give greater efficiency.

Only by imitation can others step over the perfecting period of evolution. But these imitators are not only many steps behind the leaders who have the courage to make their own way unaided, but it is a frequent occurrence to find imitations developing unforeseen weaknesses when they come up against the hard service of the field.

Usaco Air Compressors are distinctly Usaco ideas. They have consumed their thousands of dollars in experimentation and redesigning; they have passed the severe and critical tests of the Usaco factory, and in the field before being offered to the trade. And when you buy a Usaco Air Compressor you get the very latest and the very highest development in Air Compressor Manufacture. And further still, you are guaranteeing yourself the most dependable and reliable tire inflation service that money will buy.

The Usaco breaks its own path; it gives you tried and proved features first because its features are distinctly its own.

THE UNITED STATES AIR COMPRESSOR CO.

5308 Harvard Avenue, Cleveland, Ohio

Manufacturers of

Two Stage *Usaco* Air Compressors

Oplex Signs For Automobile Showrooms

A **FLEXLUME** Oplex Electric Sign will sound the note of quality which belongs to the showroom where cars of the better class are sold. Raised snow-white glass letters on a dark background make them perfect day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs and the added advantage that any trademark can be perfectly reproduced in the raised Oplex characters.

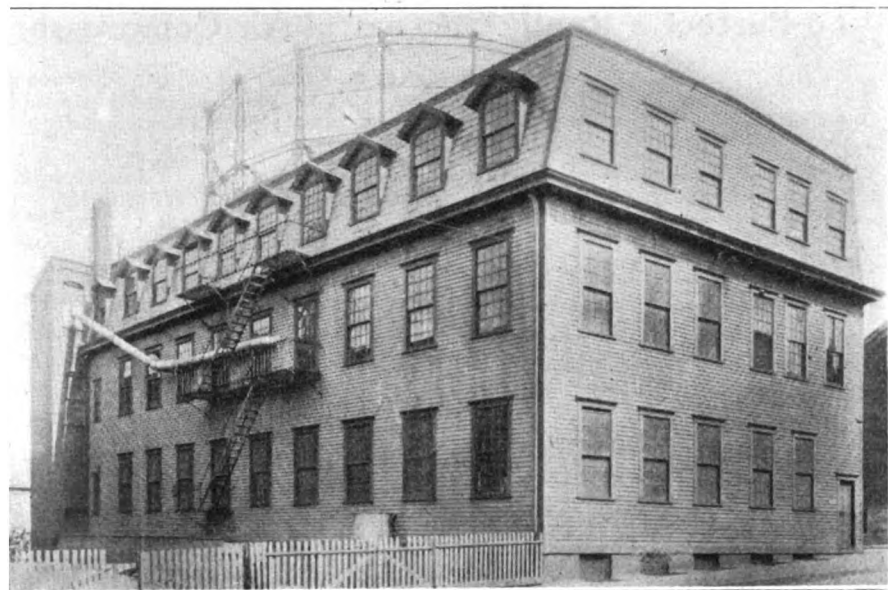
Let us send you a sketch showing an Oplex Sign to meet your particular needs.

FLEXLUME SIGN CO.
25 Kail Street Buffalo, N. Y.

d to get into larger quarters," said Frank Chapman, who was one of the original founders of the business and to whom much credit is due for the progress made, to a representative of The American

Mr. Chapman, when asked what he thought of business prospects for 1921, promptly replied that he expected this would be a big year for Nokorode soldering paste—and possibly larger than 1920,

ing paste and other specialties are now handled and sold by almost every hardware or electrical dealer, or department store of any consequence. The company attributes much of its success to its systematic and continuous advertising and to the efficiency and popularity of its products.




The New Plant of the M. W. Dunton Co. Affords Increased Facilities for Producing Nokorode Soldering Paste.

Garage & Auto Dealer. "A number of sites were considered, but the present factory, which was purchased, seemed to more satisfactorily answer the requirements of our particular business."

when a record in sales of the company's products was made.

By intensified sales effort the M. W. Dunton Co. has developed a comprehensive sales organization until Nokorode solder-



Victory Visible Gasoline Pump

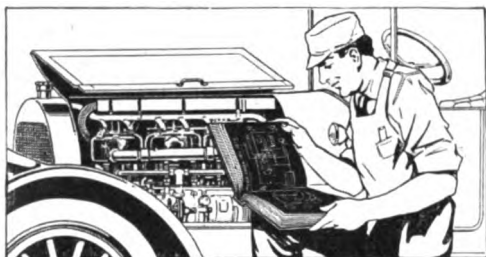
Gives everybody a square deal.

Puts an end to leaks and losses for the Dealer and wins the confidence and the trade of the motoring public.

Order now before the spring rush

TOKHEIM OIL TANK & PUMP CO.

1600 Wabash Ave., FT. WAYNE, INDIANA



Automotive Wiring Manual

is what you need to render quicker and more accurate electrical service and make more money. There is nothing to equal it on the market at any price that gives you the authentic, down-to-date electrical information on any and all cars and trucks as contained in the new 1920 edition. Contains blueprints on all cars and trucks from 1912 to date.

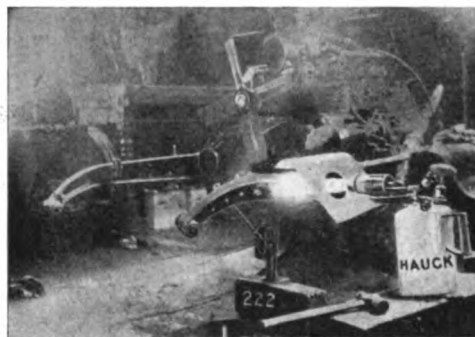
Over 800 blueprints; over 600 models of cars; 200 internals. Full size of blueprints, 7 1/4" x 11", large enough to be easily read; no need for magnifying glass to make out details. Bound in one volume, thus always complete, an advantage you cannot secure elsewhere.

QUIT GUESSING—KNOW

Your reputation as an Electrical Expert will not be made through an occasional lucky guess. You should know every time just what you are doing. The best assurance that you will is through the purchase of the Automotive Wiring Manual—1920 Edition. Price \$15.00 delivered.

Automotive Publishing Co.

448 South Dearborn St. : : : Chicago
910 So. Grand Ave., Los Angeles 41 E. 29th St., New York



Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104 "Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.

Don't get Cold Feet— 1921 will reward fighters!

Buck up! Work hard! It's nonsense to think that business has gone to the "bow-wows". In sixty or ninety more days you'll forget that it was winter. 1920 was a big year for our dealers but 1921 will be a *bigger* year. *If you can measure up to our standard, we are prepared to show you that our specialties including*

**STORAGE BATTERIES
BATTERY REPAIR TOOLS
IGNITION PARTS
TIRE REPAIR EQUIPMENT
INNER TUBES equipped with Newsom Valves**

will make you substantial profits this year.

We are now appointing "red-blooded", energetic, optimistic dealers. If interested write.

Yours for Bigger Business Profits,

Ben A. Seiff Pres

R. T. MFG. & SALES CO.

Sales Department:
3847 W. Madison St., Chicago, Ill.

Factory:
Green Bay, Wis.

Copy of "R. T." Catalog on Request



Handle Grease Easily — Swiftly — Cleanly with an O'BRIEN Heavy Duty Grease Pump

The easiest and quickest operating grease Pump on the market.

Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil.
Capacity 125 pounds or 15½ gallons oil.

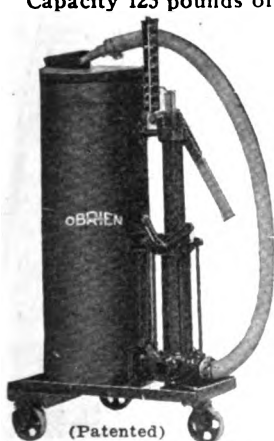
Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

**IT DOES YOUR
DIRTY WORK**

Ask your jobber about them or write us for complete information.

**The
Grease Pump Mfg. Co.**
1500 Michigan Blvd.
Chicago, Ill.



(Patented)

ROMORT AIR AND WATER STATION



**The Air Hose of the
ROMORT AIR STATION
will reach all wheels of any
car without moving the car**

Five models for all purposes, operating with supply tanks, or automatically controlled pumps separate from or in the base of the station.

Stations for curb, wall or ceiling; with and without Electric light globes.

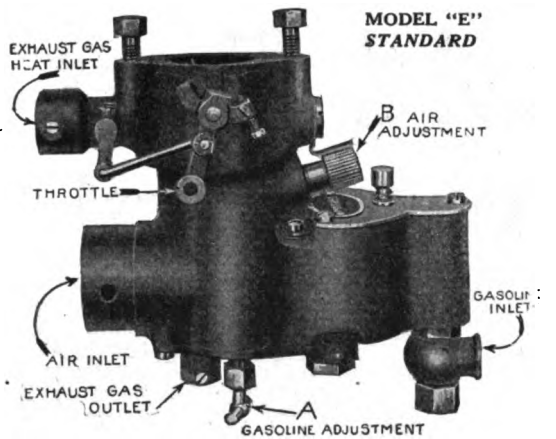
Prices \$55 to \$110 with full equipment of hose, automatic air valve, water valve and universal hose coupling.

Write our sales department for descriptive circular.

Manufacturers
The Romort Mfg. Co.
Oakfield, Wis.

Sales Dept.
The Zinke Co.
1323 Michigan Ave., Chicago, Ill.

Made by the makers of the famous Romort Air Products



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.

FINCK'S

DETROIT SPECIAL

OVERALLS & COMBINATION SUITS

**Extra Wear
in
Every Pair**

The materials that go into Finck Overalls and Combination Suits, together with the skilled workmanship and the careful design of the garments, all tend to make them wear long after the ordinary ones have found their way to the rag bag.

At your dealer's or write us.

W. M. FINCK & CO.

Detroit, Michigan

Manufacturers of High Grade Overalls,
Men's and Women's Combination
Work Suits

BRANCHES

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(76)



J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

**Audits, Investigations, Surveys, Systems
Income Tax Reports**

**Monthly Balance Sheets and
Operating Statements Prepared.**

Unit and Process Costs Established.

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Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
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*We Specialize in Systems for Automotive
Dealers*

BUTTERFIELD

**Combination
Automobile Screw Plates**

serve best on automotive work because
they were designed expressly for garages
and repair shops.



Set shown in illustration enjoys a well deserved
popularity in the automotive field.
Contains in one set—both U. S. Standard and
S. A. E. Standard taps and dies—thus saving the
expense of buying a separate outfit of each.
Every tool guaranteed to cut rapidly and to pro-
duce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

Derby Line

Vermont

U. S. A.



No Drudgery in Valve Grinding for the man with the ECLIPSE

The ballistic movement of the ECLIPSE ELECTRIC VALVE GRINDER affords the easiest as well as the best method of grinding valves. It requires only a minute or so with the grinder and both valve face and seat are smoothed to a clean, hard finish, absolutely gas tight. This light, portable, power-driven tool has ample power for grinding all automotive valves.

Write today for full information.

ECLIPSE VALVE GRINDER CO.

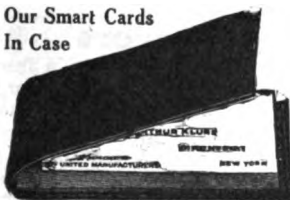
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The Best Business Card

for your use and for any man's use who desires the distinction of attention to little things is the Peerless Patent Book Form Card. It will get close and careful scrutiny, and that means an audience with most favorable attitude of mind from your prospect.

Our Smart Cards
In Case



PEERLESS PATENT BOOK FORM CARDS

not only save fifty per cent of your cards, but they are always together and get-at-able when you want to hand one out. They are always clean, perfectly flat and every edge is smooth and perfect. Send for a sample and detach the cards one by one and see for yourself. Send today.

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Engravers, Die Embossers, Plate Printers
122 So. Michigan Ave. 1104 So. Wabash Ave.
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CLARK'S UNITYPE TRADE MARK MOVE THOSE USED CARS NOW

SAVE
\$100 TO \$200 ON
THESE FINE CARS

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ALL IN GOOD CONDITION

MODEL H520

FOR NOW IS THE
TIME AND YOU'VE
GOT TO GET BUSY

"UNITYPE" SIGNS

not only do this, but they modernize the appearance of your show room.

A changeable sign—strong white on black (quick changing) that graces the magnificent show rooms of the Metropolitan Auto Rows will brighten up and put life into YOUR place too.

UNITYPE SIGNS sell your used cars for you—they bring you new customers from off the street.

UNITYPE SIGNS are all metal and come in many sizes and styles at prices within reach of all.

ASK FOR CATALOG "AG-20"
APPLIED TO AUTO DEALERS

W. L. CLARK COMPANY, Inc.
115 NASSAU ST. (Will remove to 540-542 Pearl St., March 1st) NEW YORK
PATENTEES AND EXCLUSIVE MAKERS

GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company
1002 Washington Boulevard
Chicago, Illinois



Do you throw away worn Crankshafts? They can be saved

PROOF
(Are you interested in Profits and satisfied customers?)

with the **WEBER TOOL**

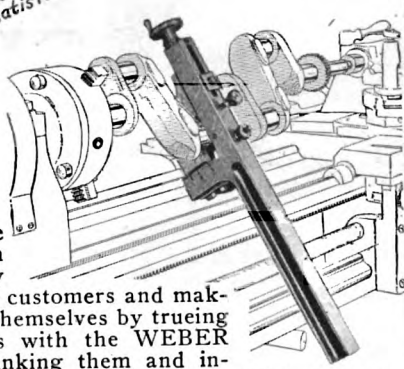
SEND FOR THIS BOOK~
It will tell you.

How garages, machine shops and repairmen all over the country are saving money for customers and making more money for themselves by truing up worn crankshafts with the WEBER TOOL instead of junking them and installing new ones.

With one setting of the crankshaft on centers' you can turn all crank-pins with the WEBER TOOL absolutely round and straight to factory standards, spending not more than ten to twenty minutes per pin.

At your jobber or write direct.

SAWYER-WEBER TOOL MFG. CO.
342 So. Alameda St. Los Angeles, Cal.





Position for Reaming Connecting Rods

The LEWIS REAMER
Multiplies Profits

in more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

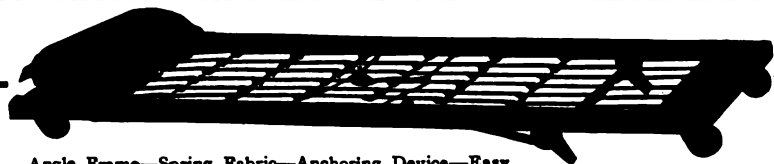
Ask your jobber or write us today for particulars.

LEWIS TOOL COMPANY
612 Fifth Ave., South Minneapolis, Minn.



Position for Reaming Main Bearings

Foster
Auto Repair Creeper
METAL CONSTRUCTION



Angle Frame—Spring Fabric—Anchoring Device—Easy Rolling Casters. Insuring a longer, more economical and efficient service than any creeper built.

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Hickens "Sod-Tor-Lite" Set No. 2. 3 tools in 1.
A self-heating soldering iron, torch and light.
Necessary in every shop. Torch to generate, Copper pointer heats in one minute.

TRIS ONE

B. E. HICKEN SOD-TOR-LITE CO.
Box 1111, Milwaukee 990

SENT ON TRIAL. PRICED LOW. Write.



KENNEDY
Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind
Canadian Branch Factory at Woodstock, Ont.



Auto Repairing Profits

The profits of the repair shop depends to a large extent on the tools and equipment you have to work with.

Write today for our catalog covering

Torit Oxy-Acetylene Torches

for soldering, brazing, battery work, radiator work, carbon burning, welding, etc.

ST. PAUL WELDING & MFG. CO.

174 W. 3rd Street

ST. PAUL, MINN.

ARE YOU GETTING WHAT YOU PAY FOR?

Are you getting maximum mileage and full power from every gallon of gas? Or Is your gas half burned and half wasted by the weak and inefficient spark of a faulty timer?

DUNTLEY FOUR UNIT TIMER

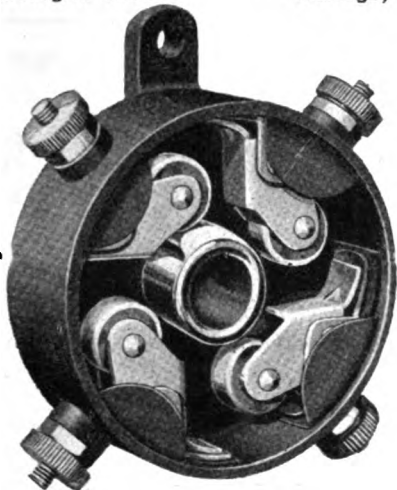
For Ford Cars—Trucks and Fordson Tractors

The mighty and unfailing spark of the Duntley turns every atom of gas into energy guaranteeing maximum power and full mileage at all times and under all conditions. Dealers Note! Duntley sales are enormous. Are you getting your share of the profits? A postal will bring full details.

J. W. DUNTLEY

1004 Michigan Ave.

Chicago, Illinois



More Turnovers With No Dead Stock

THE oftener a stock can be turned the greater a profit can be realized. But you cannot turn a heavy stock as frequently nor as easily as you can one that eliminates the carrying of a lot of "dead timber". You can turn New Eras because all bumpers are alike—only the arms differ, and a New Era stock can always be kept "fresh" by merely exchanging arms for what you have calls for. No dead timber—faster turnover—greater profits.



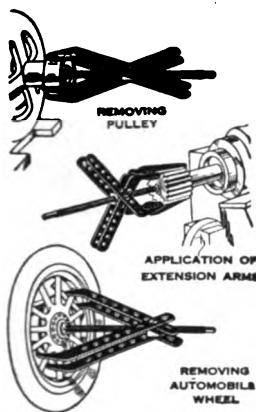
Double Bars—
Double Strength

Write for catalog.

New Era Spring & Specialty Co.
56 Cottage Grove Ave., Grand Rapids, Mich.

NEW ERA

"Better" SPRING BUMPERS



"LITTLE GIANT" GEAR AND WHEEL PULLER

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. THE HARDER THE PULL—THE TIGHTER THE GRIP. Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

Liberal Discounts to Dealers.

Premier Electric Co.

3800 Ravenswood Ave., Chicago, U. S. A.



ROSE GREASE BUCKET

For handling grease conveniently, quickly, without mess or waste, there is no equal to the Rose Fil-A-Gun Grease Bucket. Pumps grease through hose direct to point where needed. Or, one stroke of pump fills the Rose Taper Nozzle Grease Gun with which every Rose Grease Bucket is equipped.

DEALERS: Rose Grease Buckets, like Rose Tire Pumps, will increase your sales and make you good profits. Have your jobber send you complete information.

Frank Rose Mfg. Co.
Hastings, Neb.

Air! the life of the tire depends on it

Do not be afraid to press the purchase of a
**SCHRADER UNIVERSAL
TIRE PRESSURE GAUGE**
on a customer.

He will thank you for it after he discovers the saving in both tires and gasoline that it makes possible.

Price \$1.50

A. Schrader's Son Inc.
783 Atlantic Ave., Brooklyn, N.Y.



For Those Who Know and Want the Best

REYNOLDS

RED DIAMOND CUSHIONS FOR FORD CARS

A Perfect Product for Particular People

Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.

Sold thru regular channels only.

Sales Dept., The Zinke Co., 1323 Michigan Ave., Chicago, Ill.

Car owners prefer

Graham Socket Wrenches

because they make repairs and adjustments easy, prevent broken parts and save time and temper. They are turned from solid bar stock and are heat treated. For strength and reliability they are unexcelled.

With a No. 2 Set in his car the driver is ready for any emergency.

DEALERS: Write for trade prices

GRAHAM ROLLER BEARING CO.

Coudersport, Pa.

Price \$1.75



BEST BY TEST

AMERICAN ADJUSTABLE VALVE TOOLS

With these tools anyone can true to a perfect point of accuracy, any angle or degree—and size valve and seat 1" to 3" inclusive.

OVER 30,000 IN USE

Write for circular "B"

AMERICAN VALVE TOOL MFG. CO., 354 W. 50th St. NEW YORK

Watch for this Tag

It will introduce to you a complete line of automobile repair equipment, tested and used by leading Service Stations and backed by the "Fairbanks O.K." Sold by Fairbanks branch house and leading jobbers.

THE FAIRBANKS COMPANY

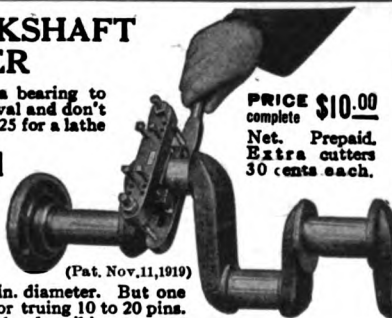
Albany Baltimore Birmingham Boston Bridgeport Buffalo
Chicago Detroit Hartford New Orleans New York Newark
Paterson Philadelphia Pittsburgh Providence Rochester
Scranton St. Louis Syracuse Tulsa Washington
Havana Kingston London Birmingham Glasgow Paris
Administrative Offices—NEW YORK

ATLAS CRANKSHAFT GRINDER

Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Use an

Atlas Grinding Tool

It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crank case. Adjustable to all crank pins from 1 1/4 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5,000 in use. Send for circular describing



PRICE \$10.00
complete
Net. Prepaid.
Extra cutters
30 cents each.

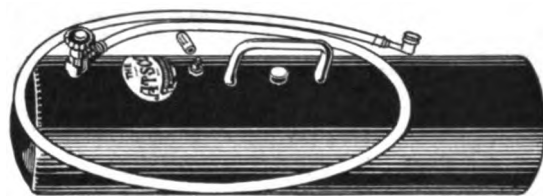
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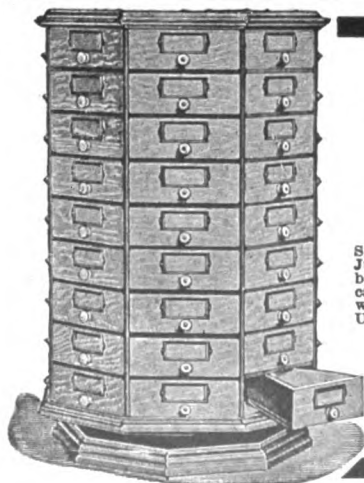


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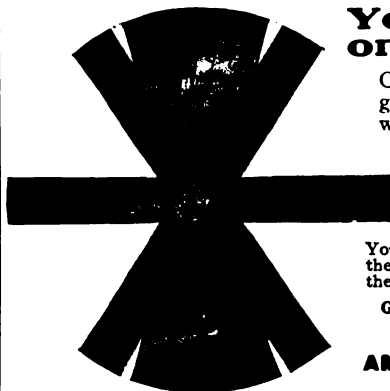
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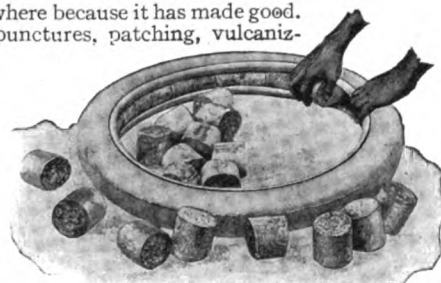
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Index to Advertisements

A		J	
Accurate System & Manifold- ing Co., Inc.	56	Jenkins Vulcan Spring Co.	56
Air-Tight Steel Tank Co.	56		
Albertus & Co., F. A.	4		
American Bolt & Screw Case Co.	56		
American Valve Tool Mfg. Co.	56		
Am-pe-co Sales Co.	57		
Apco Mfg. Co., The.	57		
Atlas Auto Supply Co.	56		
Atlas Mfg. Co.	56		
Auto Engine Works.	56		
Automatic Safety Tire Valve Corp.	50		
Automotive Publ. Co.	50		
B		K	
Beck & Corbitt.	57	Kastens, Henry.	—
Boddy J. Newton.	52	Kennedy Car Liner & Bag Co.	54
Brunner Mfg. Co.	6		
Burd High Compression Ring Co.	57		
Burgess-Norton Mfg. Co.	59		
Burlington Auto Supply Mfg. Co.	—		
Butler Mfg. Co.	58		
Butterfield & Co.	52		
C		L	
Casco Mfg. Co.	—	Laminated Shim Co.	7
Catelain, Andre G.	58	Lewis Tool Co.	54
Champion Pneumatic Machin- ery Co.	62-63	Lourie Mfg. Co.	57
Channon-Hughson Co.	61		
Clark Co., W. L.	53		
Cornell Tire Protector Co.	—		
Criterion Cap Co.	—		
Curtis Pneumatic Machinery Co.	73		
D		M	
Davies-Young Soap Co.	—	McDaniel Rubber Co., Leo.	—
Dickerson, C. A.	37	Marvel Carburetor Co.	52
Duntley, J. W.	55	Marvel Machinery Co.	3
Dunton Co., The M. W.	—	Milwaukee Tank Works.	—
Dyer Co., The.	61	Motor Salvage Co.	58
E		N	
Eclipse Valve Grinder Co.	53	National Cash Register Co.	45
F		National Refining Co.	35
Fairbanks Co.	56	National Rubber Filler Co.	57
Farr's Sure-Hold-Tire-Cement Co.	—	New England Mills Co.	—
Federal Electric Co.	—	New Era Spring & Specialty Co.	55
Finck & Co., W. M.	52	Norma Company of America, The.	—
Flexlume Sign Co.	49		
Foster Bros. Mfg. Co.	54		
G		P	
Ganschow Co., William.	53	Paro, H. G. Co.	—
Garden City Spring Works.	61	Parts Service Co.	58
General Utility Co.	41	Peerless Engineering Co.	47
Globe Mfg. Co.	5	Phillips, H. E. & Co.	—
Goodrich Rubber Co., The B. F.	—	Premier Electric Co.	55
Graham Roller Bearing Co., The.	56		
Grease Pump Mfg. Co., The.	51		
Green Engineering Co.	58		
Greer College of Motoring.	59		
H		R	
Harner Mfg. Co., E. C.	—	Reynolds Spring Co.	56
Harvey Spring & Forging Co.	43	Romort Mfg. Co.	51
Hauck Mfg. Co.	50	Rose Mfg. Co., Frank.	55
Heiser Special Tool Co.	—	R. T. Mfg. & Sales Co.	51
Hermann, J.	—		
Hicken Sod-Tor-Lite Co., B. E.	54		
I		S	
		Shaler Co., C. A.	Front Cover
		St. Paul Welding & Mfg. Co.	54
		Sawyer-Weber Tool Mfg. Co.	54
		Schrader's Son, Inc., A.	55
		Smith Co., The W. J.	—
		States Chemical Co.	8
		Stiles Mfg. Co.	—
		Storm Mfg. Co.	57
		Sunderland Machinery & Sup- ply Co.	58
J		T	
		Tokheim Oil Tank & Pump Co.	50
		Trindl Co., The.	59
		Tungsten Mfg. Co.	4
K		U	
		U. S. Air Compressor Co.	49
		Universal Mfg. & Sales Co.	57
L		V	
		Victory Oil Stove Co.	50
M		W	
		Wagner Specialty Co.	58
		Warshawsky & Co.	58
		Washburn Burner Corp.	—
		Webber & Co., P. H.	47
		Weston Electrical Instrument Co.	—
		Wiggins Co., The John B.	53
		Worcester Abrasive Co.	39
N		Z	
		Zinke Co.	51 and 56

PISTONS AND PINS

Finished—Semi-Finished



All Makes and
Models of Pleas-
ure Cars, Trucks,
Tractors

Automotive and hardware jobbers buy Dyer Pistons because their dealers demand the best. Finished pistons include bushings if so designed. Semi-finished pistons have center grooves standard diameter and pin holes rough reamed with center marks.

LOOK FOR THE NAME

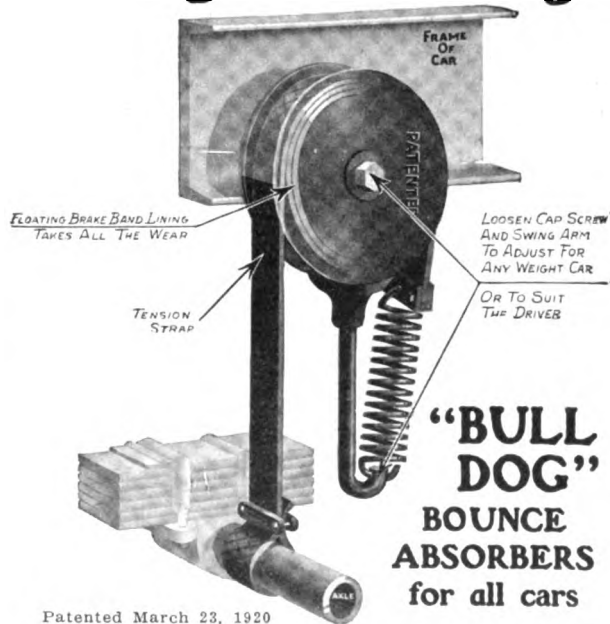
Each Dyer piston is individually packed and marked. Standard and .0025, .005, .010, .015, .020, .025, .031, .035, .040, .045 over-size. Semi-finished Pistons are .062 and Pins .020 over-size.

All Models—All Sizes

THE DYER COMPANY

CAMBRIDGE, MASS.

**No more broken springs
Better tire service
More gasoline mileage**

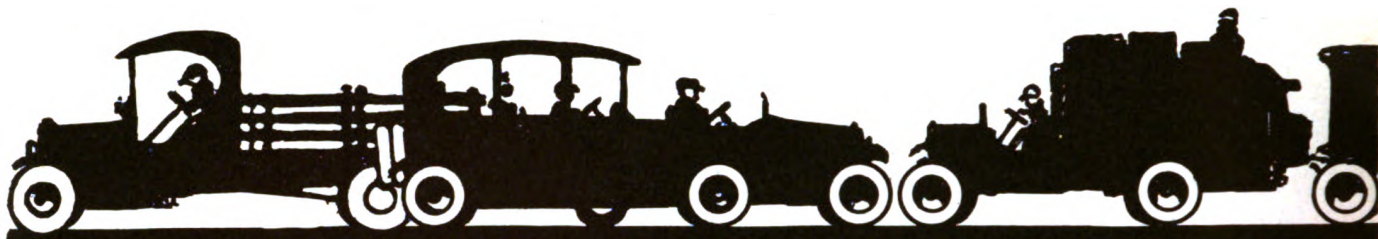


Patented March 23, 1920

relieve the strain that break springs and wear out tires. Can be adjusted to fit any car. Made for both front and rear springs. DEALERS—Get data and trade prices.

CHANNON-HUGHSON CO., 229-233 W. Erie St. Chicago, Ill.

**AUTOMOBILE
SPRINGS**
MANUFACTURERS AND SPRING SERVICE
GARDEN CITY SPRING WORKS
2300 Archer Ave. Chicago



ARE YOU GETTING THEIR BUSINESS ?



In these days of keen competition our old friend SERVICE has come back into his own.

The most effective means of securing new customers from the endless stream of cars and trucks that pass by your door is by giving the best Air Service in your locality. A CHAMPION Two Stage Automatic Unit will not only enable you to give such a service, but will enable you to give it at a minimum cost.

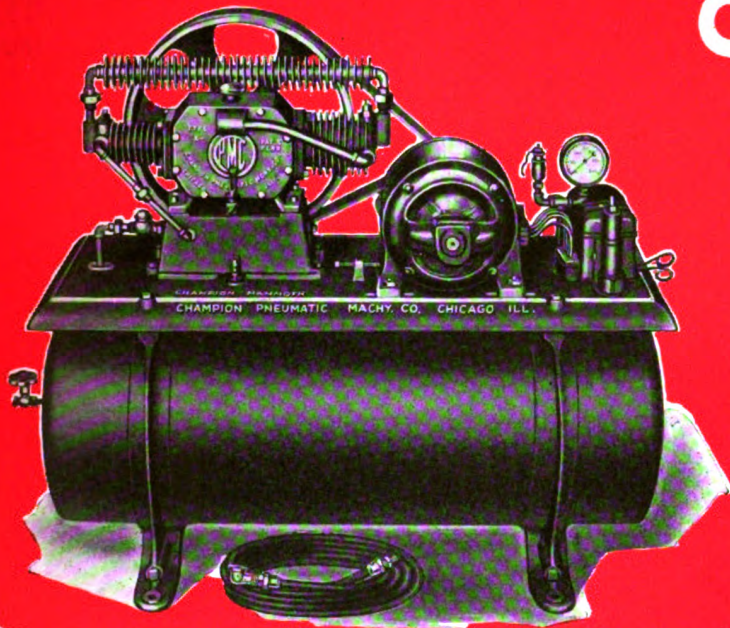
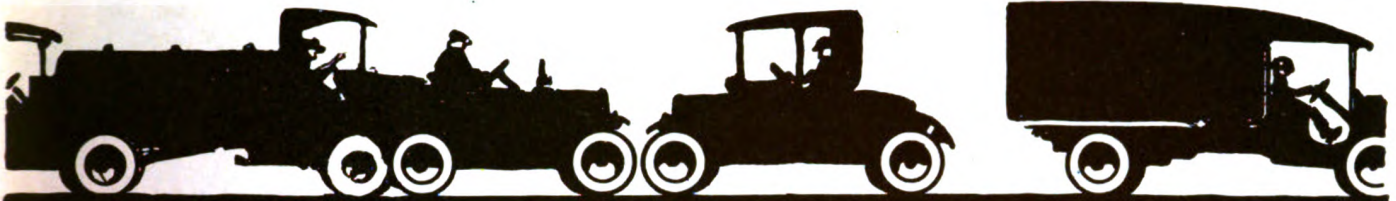
The CHAMPION Air and Water Stand

offers the latest and most satisfactory method of supplying air and water to the motoring public. As handsome as a boulevard light—its appearance reflects credit on your establishment. The air hose has such a long reach that any tire on the car or truck is readily accessible. After filling the tires, the hose is simply released by the user and the arm automatically and gradually returns to the normal vertical position without danger of the nozzle striking and injuring any part of the car or its occupants. Both air and water hoses hang clear of the ground when not in use, protecting them against injury.

Back of this air and water stand you want the Compressor that keeps up the pressure and keeps down the expense—works without tinkering and always gives prompt dependable service. The CHAMPION serves best because it is made best. Features include—Valves of mushroom type, housed in bronze cages; Annular Ball Bearings (an exclusive CHAMPION feature); Automatic Pressure Release, which assures pure, dry air, free from oil, and permits the motor to start against no pressure.



Champion Air



Cut the Cost of
"Free Air"

THE CHAMPION MAMMOTH

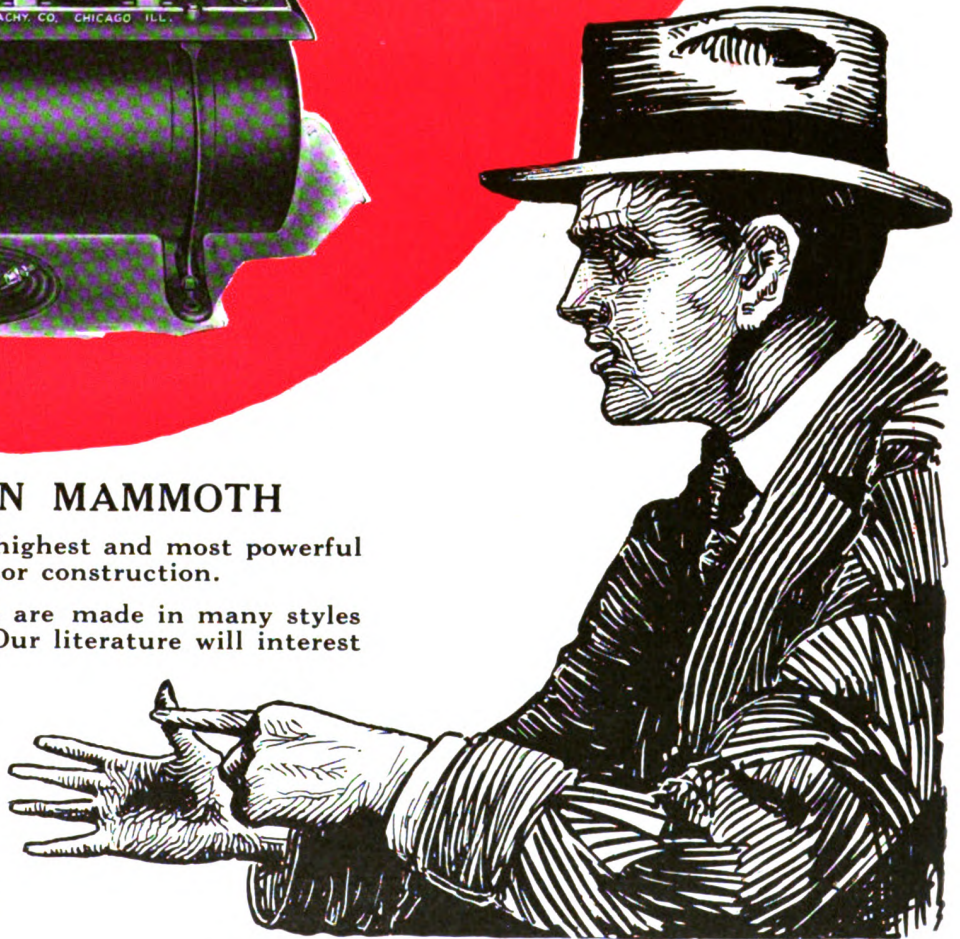
shown above, represents the highest and most powerful development in air compressor construction.

CHAMPION Air Compressors are made in many styles embracing every purpose. Our literature will interest you—write for it today.

DISTRIBUTORS—We have an attractive proposition for you.

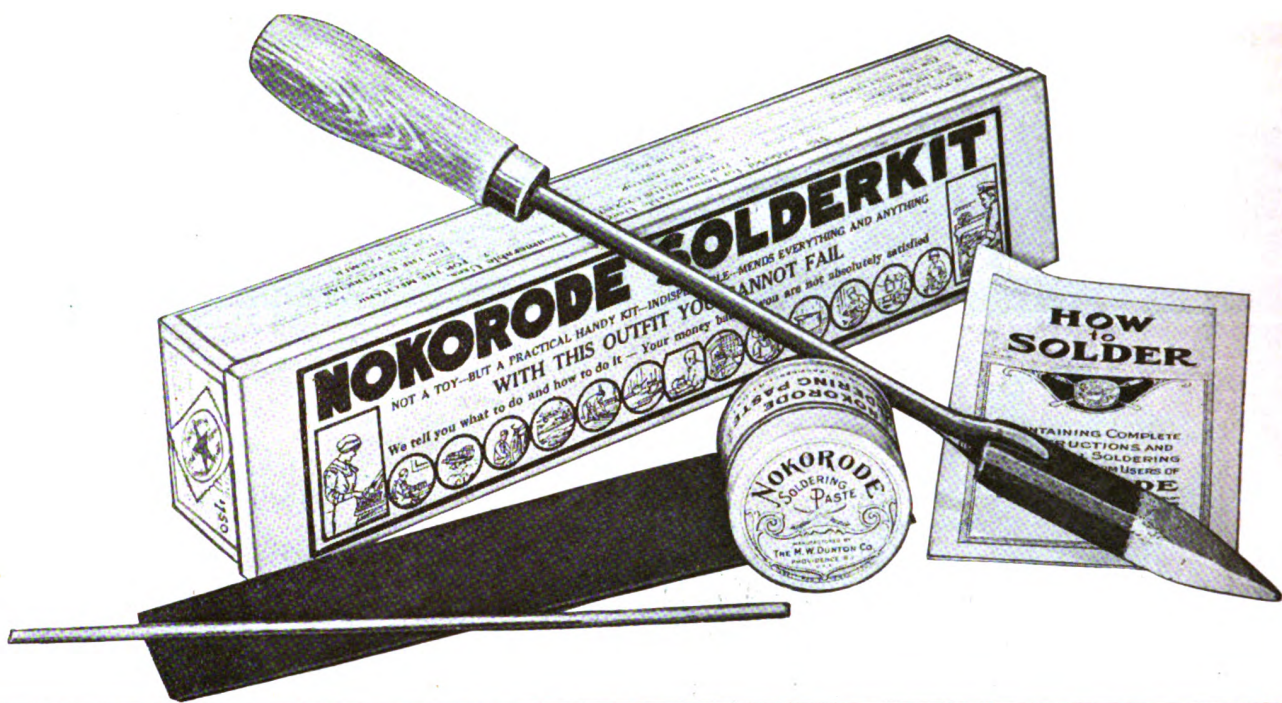
**CHAMPION PNEUMATIC
MACHINERY CO.**

1402 So. Michigan Ave., Chicago, Ill.



Compressors





The **NOKORODE SOLDERKIT** appeals strongly to every motorist

There is some reason or other why practically every owner of a car will buy a SOLDERKIT.

Some motorists like to have it because it prevents delays and breakdowns on the road. It appeals to others because it enables them to make numerous repairs at a great saving. Any man who likes to tinker on his own car proves a ready purchaser. Users of motor trucks equip their drivers with SOLDERKITS because they save many costly delays.

The man with a SOLDERKIT can make repairs on many parts of his car, including leaky radiators, cracks on the body, leaks in the gas tank or its pipes, broken connections on the batteries, and other parts that require soldering. The roadside repairs that can be made with a SOLDERKIT avert many a serious breakdown.

The SOLDERKIT is a thoroughly practical outfit, containing complete instructions for soldering and the tools to do the work.

Retail Price—\$1.50

A big seller because of its many uses.

Write today for complete data and trade prices.

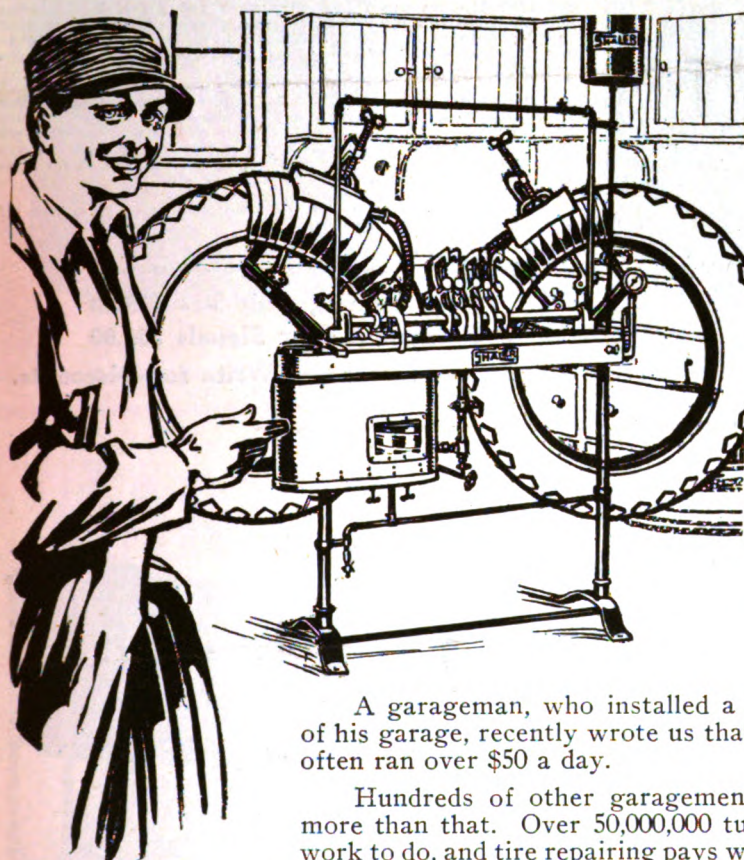
The M. W. DUNTON COMPANY
PROVIDENCE, R. I., U. S. A.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

MARCH, 1921

Vol. 12.—No. 3.
10 Cents the Copy
\$1.00 Per Year.



**How He
Makes
\$50 a Day
in a Corner
of his Garage**

A garageman, who installed a SHALER Vulcanizing Plant in a vacant corner of his garage, recently wrote us that the first day he made \$45 and that his profits often ran over \$50 a day.

Hundreds of other garagemen are doing just as well, and many make much more than that. Over 50,000,000 tubes and casings need repairs. There is plenty of work to do, and tire repairing pays well. It's easy to get all the work that you can do.

The SHALER Shop Vulcanizer is so simple that a boy can operate it. You don't need experienced help because it has Automatic Heat Control, and cannot overcure or undercure the rubber. You don't need to watch or regulate it.

With the SHALER you can make any kind of a casing repair that is practicable to make—and it has a very large capacity. Repairs 12 casings and 200 tubes a day, and does perfect work. It only requires about as much room as a bicycle—and is portable—but does just as much

work as the big cumbersome vulcanizing plants which take much more room, cost several times as much and require an experienced operator.

The SHALER uses the "Wrapped-Tread" Method—which is used by tire manufacturers—and turns out better jobs in less time than any other method.

The complete SHALER Vulcanizing Plant—equipped with gas or gasoline burners for steam heat—or for electricity—including all necessary tools and complete instructions, costs less than \$100.

Write for Free Book—"How to Open a Tire Repair Shop"

which gives many helpful suggestions and simple instructions for making tire repairs. Don't fail to write for this book today. It will show you how to make more money and establish a profitable tire repair business. Do you know of any other business which pays so well that can be started for less than \$100?

We manufacture a complete line of SHALER Vulcanizers for every requirement of Garages, Repair Shops and Service Stations. They are used by the U. S. Government—and sold by reliable Jobbers all over the world. Write for our catalog which describes the complete SHALER Line, of steam, electric and dry fuel vulcanizers.

C. A. SHALER CO.,

352 Fourth Street,

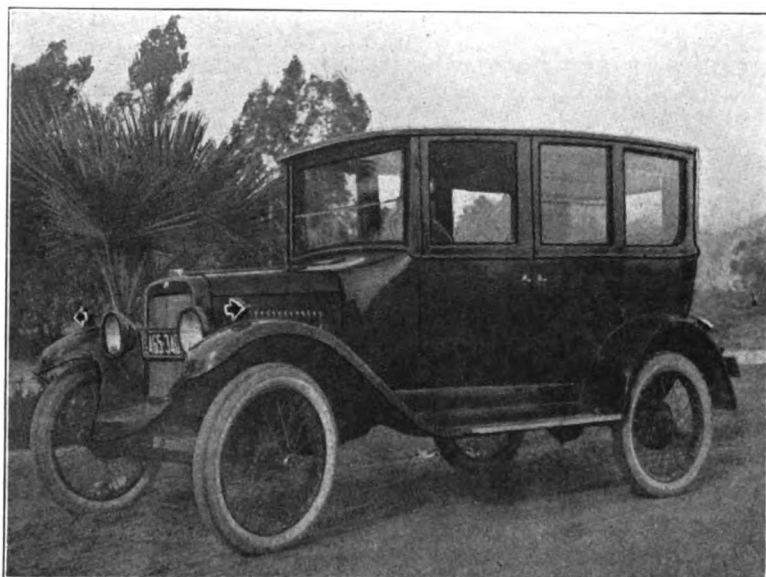
Waupun, Wisconsin

Oldest and Largest Manufacturers of Vulcanizers in the World.

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Don't Make the Driver Behind You Guess Tell Him With ARO



Patented July 13, 1920

The lack of proper signaling by automobile drivers is responsible for a high percentage of accidents today. These accidents are avoidable—ARO prevents them.

The arrow is the natural direction indicator, and the ARO signal is a patented Electrical device embodying the use of this natural indicator of direction. ARO is constructed of aluminum with standard connections for all makes of cars.

The complete ARO device includes an ARO direction indicator for each fender, front and rear. Is attached to the battery of the car, and is operated by a double switch conveniently placed on the steering post. The aluminum AROS for rear fenders are faced with ruby red glass, while those for the front fenders are of emerald green. Each of the four AROS contains a 21 C.P. Nitrogen bulb, and the "daylight-proof" construction of the ARO makes them equally effective both day and night.

ARO makes motoring safer and more enjoyable by taking away the risk of collisions. ARO protects all four corners of your car. An illuminated ARO on both rear fenders indicates a stop. Illuminated AROS on the fenders of one side only signify a turn in that direction. There is no mistaking this positive signal of a turn or stop.

ARO is made in sets of 2 for rear fenders only, or sets of 4 for front and rear fenders.

YOUR customers will want ARO.
Get our liberal Dealer offer.

Rear Signals, Only - - \$18.50

Front and Rear Signals \$30.00

Dealers and Jobbers—Write for Discounts.

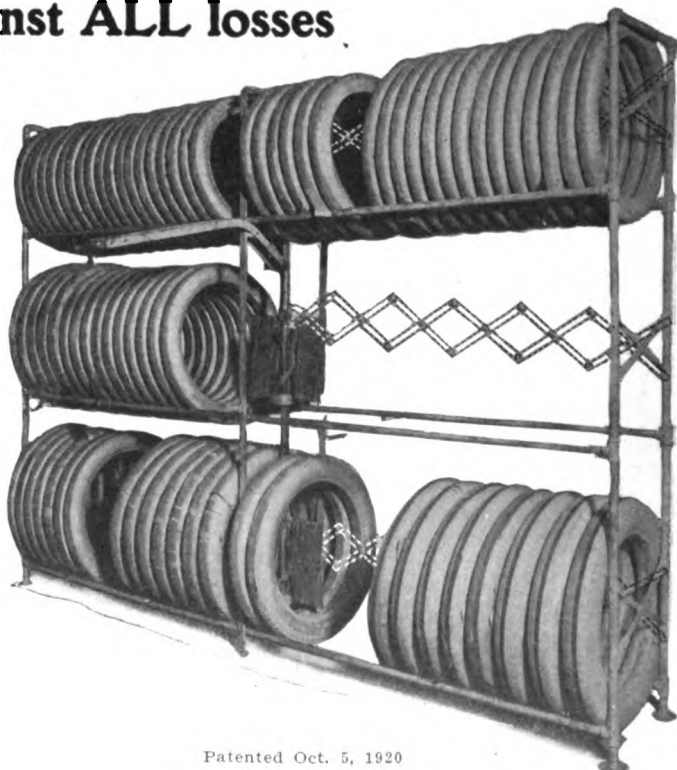
THE SECURITY— Protection against ALL losses

When you lock up your stock of tires at night with the SECURITY, you **know** every tire will be in place the next morning. The SECURITY is positive protection from losses of all kinds.

As well as protection from losses, the SECURITY TIRE RACK is a booster of tire sales. It enables a neat and attractive display of your entire stock—keeps your tires in perfect condition, and conserves valuable space.

The SECURITY is simple but positive in action. When the lever arm is raised it automatically releases every tire in the rack. By lowering the lever arm it extends the lazy tongs and securely locks all tires in the rack. Lever arm is equipped with Yale thief-proof spring lock, which automatically locks the lever arm to the frame.

We have an attractive offer to make every tire dealer in the country, and one that will appeal to you. Ask for details.



Patented Oct. 5, 1920

THE W. J. SMITH CO.

1834 Broadway

New York, N. Y.



MARCO

"The Piston Supreme"

Light in weight—substantial in construction—guaranteed.

Made of selected, close-grained gray iron of the best quality. Nothing experimental, freakish or unproven.

MARCO IS TO PISTONS
AS

STERLING IS TO SILVER

Insist upon Marco. Safeguard yourself from loss of compression, fouled spark plugs, piston slap, sticking and excessive pumping of oil.

For sale by dealers everywhere. Ask your jobber.

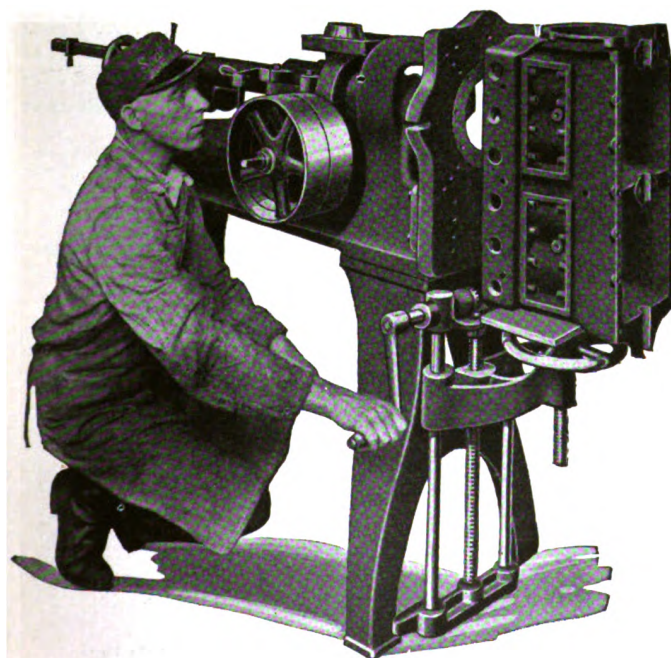
*Write for Catalog and Prices
to Department of Piston Sales*

616 So. Michigan Ave., Chicago, Ill.

Headquarters

Marvel Machinery Co.
MINNEAPOLIS - - MINNESOTA

MARVEL CYLINDER REBORING MACHINES



Lining a Block on a Marvel Reboring Machine

The Marvel is simplicity itself—strong—rigid—tried out—tested and proven.

It is power driven—automatic and easily operated. No automotive repair or machine shop is complete without a Marvel.

It doubles the output on a most profitable class of work.

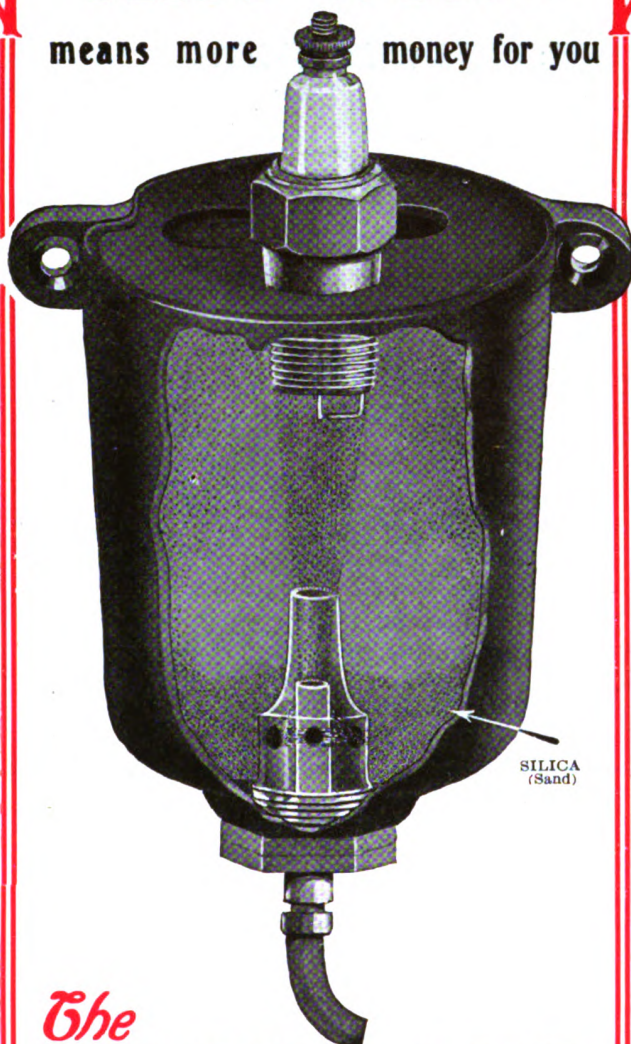
Our Business-Building Service helps you get the business.

Write at once to the manufacturers for complete information.

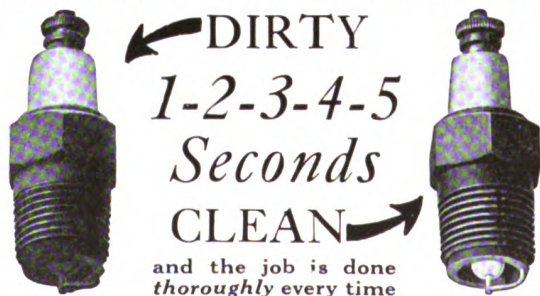
Marvel Machinery Co.
Loan & Trust Bldg. Minneapolis, Minn..

FAST WORK

means more money for you



The HURY-KANE SPARK PLUG CLEANER



and the job is done
thoroughly every time

HOW IT WORKS: Just hold the plug firmly in place. Apply air to nozzle at bottom of cleaner by permanent attachment with lever control. Hose with tire filling valve may be used in the same manner that you fill a tire. Apply air intermittently as you count five.

Over 60 million spark plugs in use today require cleaning 4 times a year. Get a bigger share of this work—do it with less labor and more profit with a HURY-KANE. Your compressed air does the work.

Price \$12.00

BREWER SPECIALTY CORP.
2453 So. Wabash Ave., Chicago

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Honesty, Courtesy and Ability.....	9
Automobile Man in Cabinet.....	9
Education of Careless Motorists.....	10
Worst Is Over.....	10
Time the Great Healer.....	10

GENERAL

Helping Owners to Help Themselves, by Robert Falconer	11
A Service Station that Is "Different", by J. E. Bullard	12-13
A Feller Is Paid for Doing His Best, by Frank Farrington	14-15
Cartoon	18
Highway Law and the Garage Owner, by Chesla C. Sherlock	19
Build Business with Electric Signs, by C. B. McCuaig	20-21
Making Profitable Use of Window Space.....	22-23
Do You Make 'Em or Get 'Em?—Taps and Dies, by J. N. Bagley.....	26-27
Glimpses in the Garageman's World.....	28
Trouble-Shooting Air Compressors, by C. N. Dickerson	29-30

DEPARTMENTS

Accounting, by J. N. Boddy.....	16-17-22
Welding, Cutting and Brazing Practice, by David Baxter	24-25-30
Practical Hints for Shop Mechanics.....	32-34
Readers' Questions and Answers.....	36-38
Accessories—Dealers' Key to Profits.....	40-42
Up-to-the-Minute Garage Equipment.....	44-46-48-50

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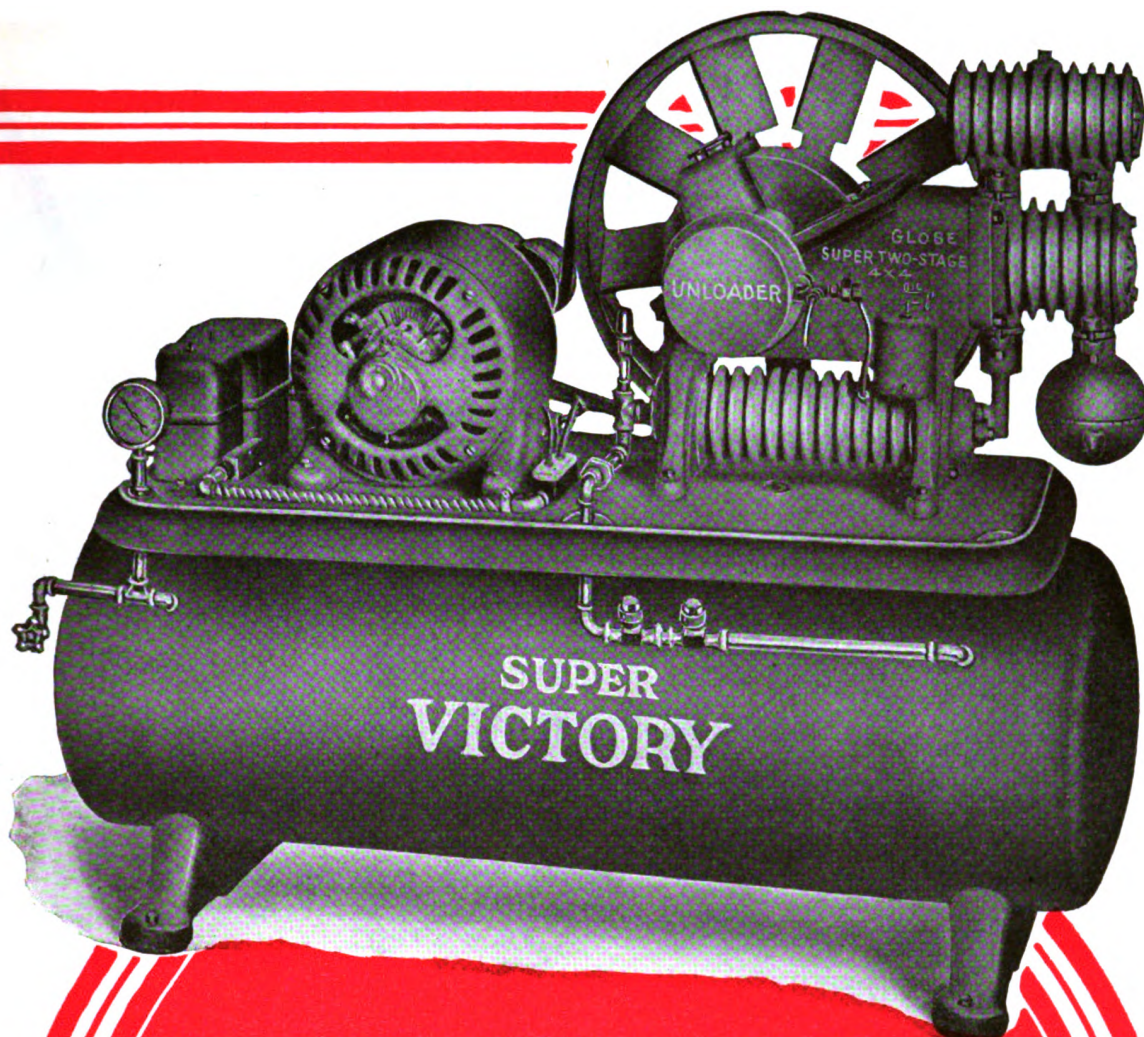
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Entered as second-class matter, March 1, 1916, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879

Subscription per Annum (Postage Paid) \$1.00. Advertising Rates on Request.



Make your Air Service an Asset

to your business—not merely a necessary expense. Install the compressor that combines top-notch service with economy.

GLOBE SUPER TWO-STAGE

A two-stage compressor having but a single light weight piston, only one cylinder, one connecting rod and no stuffing boxes. It combines all of the desirable features of both single-stage and all other types of two-stage compressors, without any of the disadvantages of either. Scrupulous care has been employed in every detail of construction of this compressor assuring a long life under the most exacting service conditions.

THE GLOBE SUPER TWO-STAGE inflates giant pneumatics and all other tires as easily as toy balloons. It develops as high as 250 or 300 pounds pressure. It always starts easily and instantly.

This compressor will enable you to give the best air service in your community.

Ask your jobber or write us for complete information.

GLOBE MANUFACTURING COMPANY

BATTLE CREEK

MICHIGAN



ON THEIR WAY IN 7 MINUTES

A Broken Axle is Nothing Serious to the Ford Owner with a Slipon

The Slipon Emergency Axle ends the trouble, lost time and towing costs which a broken axle has meant to Ford owners. It is especially valuable to all who use Fords for commercial purposes as it eliminates the chance of losing the service of the car or truck at a busy time. To tourists it is a welcome relief from the fear of being "hung up" miles from home.

The Slipon is bolted to the brake drum. Three fluted rollers quickly lock the broken shaft and the sound axle drives the car which is on its way in less than ten minutes after the accident occurred. The Slipon serves perfectly until the car is driven to the place where a permanent repair can be made. This device can be carried conveniently under the seat, out of the way, but always ready in case an axle breaks.

DEALERS—Stock this big seller for the Ford service, truck and tourist trade. Write today for data and trade prices.

THE SLIPON COMPANY, Mfrs.

MILWAUKEE,

Dept. A.

WISCONSIN



RETAIL
\$7⁵⁰

Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

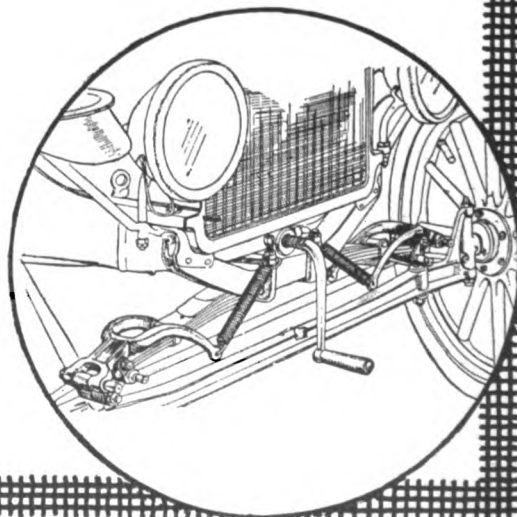
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

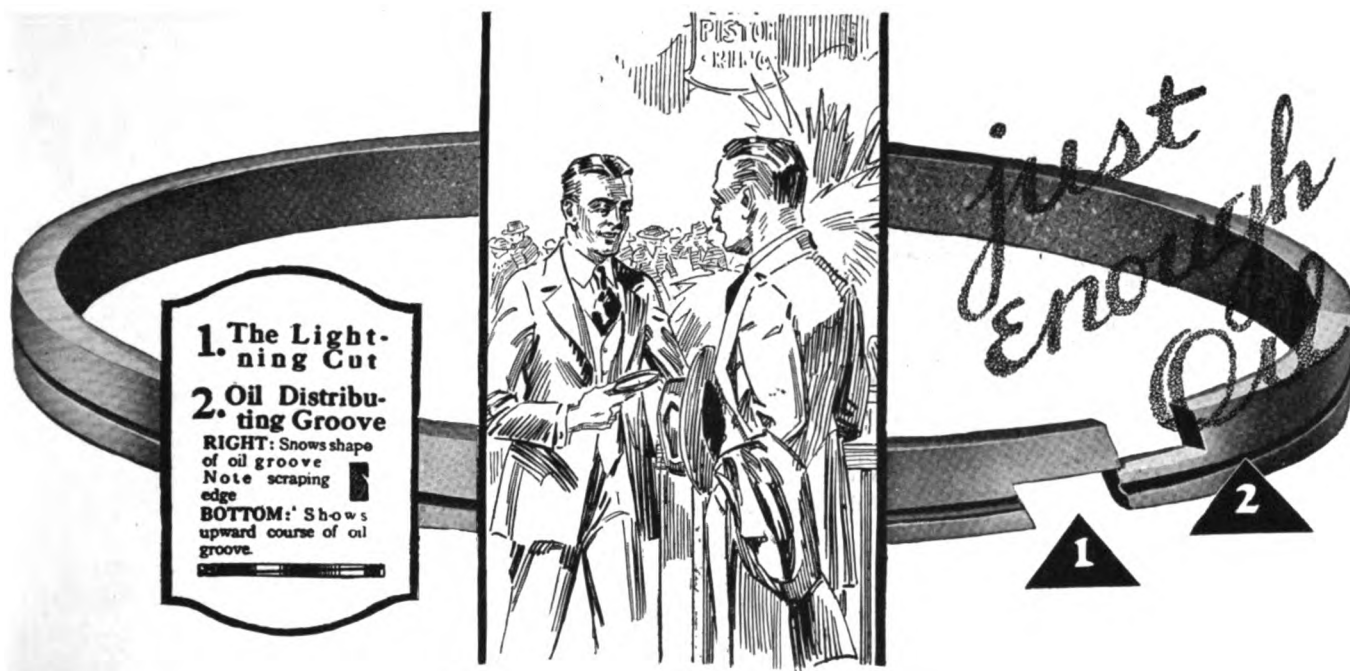
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—**RICHARD-WILCOX CANADIAN CO., Ltd.**
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



At One of the Recent Shows a Piston Ring Demonstrator Said:

"Our ring is not cut with an oil groove for the very good reason that an oil groove collects tiny particles of carbon, clogs up and does not serve the purpose for which it is intended.

Of course we did not expect this young man to make an exception of the General Lightning Cut Ring. And he had hit the nail squarely on the head so far as some oil-grooved rings are concerned.

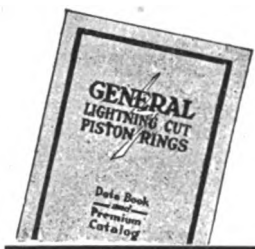
Our satisfaction came from the unconscious admission that if an oil groove did not clog, *it would serve the purpose for which it was intended.*

We might have told him about

the Wandering oil groove and patent No. 1354287 which prevents the oil grooves of other rings being cut *up, around and down* to the joint.

That the course of the Wandering oil groove carries the tiny particles of carbon *down hill*, through the lower part of the joint and into the crankcase. That, instead of clogging, this Wandering oil groove actually lubricates both the ring and the wall and minimizes friction.

That its scraping edge saves gallons of precious oil. That the General Lightning Cut Ring is of concentric shape and why. That it is individually cast and *not* sliced from a pot casting.



GENERAL UTILITY COMPANY
1326-28-30 Ogden Street, Philadelphia, Pa.
Export Department: 17 Battery Place, New York City

General LIGHTNING CUT PISTON RINGS

Now 50c
and up

Now 50c
and up

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



**You will sit up
and
take action
when you
get our
special
dealer
offer**

What the Trade says about TIRE-DOH:

"Have sold TIRE-DOH for 3 years. Have had many repeat orders and no complaints."

From a Delaware Tire Dealer.

"TIRE-DOH is better than anything for repairs. Have handled it 10 years and it is an exceptionally easy seller."

From a Georgia Dealer

"Our experience proves that TIRE-DOH makes excellent repairs, as its manufacturers claim. Repeat sales are many."

From an Arizona Dealer.

(Extracts from an investigation made recently by the American Garage and Auto Dealer).

We have an especially worth-while proposition to offer to a few really live dealers—the kind that will recognize a good thing and push it for all its worth.

1921 sales on TIRE-DOH are going to break all records and to make it doubly worth your while—the dealer margin of profit is going to be greater.

Our Special Dealer Offer will appeal especially to dealers who have handled TIRE-DOH and know its merits. Those who are not familiar with TIRE-DOH should investigate it now.



The Standard Tire Repair Outfit has made good on every kind of tire and casing repairs—in every part of the country, regardless of climatic conditions. This dough-like rubber compound can be moulded into any desired shape to cover any size cut, tear or puncture. It cures upon exposure to the air and stretches with the rubber, making any repair as strong and lasting as the tube itself.

TIRE-DOH appeals strongly to every car owner because it adds hundreds—often thousands—of miles to the life of any tire or tube. Those who buy it once invariably keep coming back for more.

If you want to enjoy exceptional profits on an exceptionally good repeat seller write at once for our Special Dealer Offer.

Atlas Auto Supply Co.

680 W. Austin Ave.

Chicago, Illinois



American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 3.

CHICAGO

March, 1921

Honesty, Courtesy and Ability.

"Honesty, Courtesy, and Ability" are the words which greeted us as we opened a recent letter from one of our subscribers. They were printed in a conspicuous position, to one side near the top of the letterhead—right where they attract the first attention.

This garageman has caught the spirit which is recognized as the one which wins every time. In the past few years this spirit was pushed to one side, but with the sudden change last fall from a seller's to a buyer's market, it has been brought back to its former position by those who had abandoned it.

Denver garagemen are catching the spirit of the new era which the industry has entered. "Always on the Square" is the motto of a new organization known as the Denver Garage & Repairmen's Association. Its purpose is to insure uniform prices, reliable services and absolute satisfaction.

The emblem of the association consists of a master gear with a small lad perched upon a carpenter's square in the center of the gear. The name is inscribed on an inner circle with the slogan "Always on the Square." This emblem is to be used by all members of the association on their advertising literature, letterheads and signs.

It is the intention to live up to the slogan so that car owners when they see the emblem will know that they can trust their cars to the repairman, knowing that he is going to give it fair and just treatment.

The purpose of the organization is to dispel doubt, relieve suspense, and instill confidence, and thus add to the pleasure of motoring.

The car owner, having dealt with members of the organization which displays the motto "Always on the Square" will take his car to that gar-

OPPORTUNITY AND ACHIEVEMENT.

Each day has its own particular kind of ripened fruit of opportunity, which must be gathered on that particular day, if ever. If men would live nearer to the limit of their possibilities, they would thereby grow stronger for greater achievements, just as physical exercise will develop weak muscles.—Edmund Ward.

age more often, keep it in better shape, and by so doing will receive many, many more miles of service from it.

It's the policy of "Honesty, Courtesy and Ability."

Automobile Man in Cabinet.

The beginning of this month witnessed the inauguration of a new President and the taking of office of a new cabinet. Ever since the election last fall, there has been much speculation as to the men who would be selected by Mr. Harding as his associates in the conduct of the government.

The names of many men were mentioned in connection with the various cabinet positions—but the one who was finally named as Secretary of Navy, was a "dark horse." Automobile men were glad that Edwin

Denby was invited to take the important post of Secretary of Navy, for now the cabinet has one man in it who really understands the automotive industry—an understanding gained by actual experience in the manufacturing of automobiles and motor trucks.

After serving in Congress from 1905 to 1911, Mr. Denby took the direction of the Hupp Automobile Co. and at the time this country entered the World War was head of the company that bears his name—the Denby Motor Truck Corp.

In April, 1917, Mr. Denby enlisted as a private in the Marine Corps. He was sent to Paris Island, and although 47 years old, completed the strenuous "boots" training there and rose from corporal and sergeant to second lieutenant. He left the service a Major of Reserve.

Major Denby was detailed as morale officer of the command to which he was attached. General George Barnett, former commandant of the Marine Corps, has been quoted as saying that Denby did more than any other man to inspire marines with enthusiasm and esprit de corps. To all recruits sent to Paris Island, he delivered a lecture on the history of the corps and devotion to duty. He was three months in France on a tour of duty for observation at the front.

That Major Denby adds strength to the Cabinet is the opinion of those who know him and are familiar with his accomplishments as an automobile manufacturer, a statesman and a marine.

Careless Motorists.

Public opinion is regarded by the National Automobile Chamber of Commerce as the best weapon that can be used to stop recklessness in the driving of automobiles. It has, therefore, appropriated \$5,000 to be awarded for essays by school children on safety.

Interest on the part of school children is calculated to impress the subject of automobile safety on their elders, and to bring up the younger generation with consideration for human life.

Fatalities in relation to number of cars have been cut in half in five years, but the total number of automobiles is so great that even a small fraction of reckless drivers presents a serious problem. Added to the harm of the careless driver is the reckless pedestrian. Police Commissioner Enright of New York City says that his records show that 78 per cent of the automobile accidents are the fault of pedestrians failing to cross at corners, running past the traffic officer and jaywalking. Education can minimize this evil.

Time, the Great Healer.

"We kept our sales force on their territories right along through the winter, although we did practically no business for 60 days. The last two weeks of February brought in a little business, but it is doubtful that we would have had any business at this time if we had laid down or laid off our territory men."

Thus wrote one of our good friends who is located in real agricultural territory, depending entirely upon the farming interests for business. Last year the truck sales constituted a large proportion of this dealer's business, but this year he expects the passenger car sales to predominate.

"When the farmer's wheat dropped from \$2.50 to \$1.25 a bushel, it was a hard blow and like hitting a man on the head, it is something he doesn't get over at once," said this dealer.

"But 'time is the great healer,'" he continued, "and it will not be long

before our farmers will have forgotten how much money they might have had if the grain prices had stayed up. Then if they can beg or borrow enough money to get an automobile to ride in, they will certainly have it."

There is a lot of good hard common sense in this dealer's comment. To get business, one must continually be going after it. It will never come

When you would make sales let the customer do a good deal of the talking. Be ready, however, to present your own side of the case at the psychological moment, but do it in as FEW WORDS as you can. Don't use any round-about arguments, involved sentences, and big words. Short sentences, clear ideas and faith in your own proposition, will convince. REMEMBER, COMPRESSION GIVES POWER; EXPANSION DISSIPATES POWER.

as a result of sitting down and wishing for it.

"Why," said an insurance salesman, "the other day I went into an office where I had been calling for several years without getting any business, and the president cordially greeted me. Then he said that the next insurance the firm has written—and it handles a good deal of real estate—would go to me. It surely pays to keep at it."

"Business is always good" for those who believe in keeping at it. If it slows down in one thing they immediately begin hammering on something else. If car sales are slow, trucks are pushed or repairs and accessories are talked about.

And as "Time is the great healer," so the slump in the automotive industry will be more and more in the distant past as each month passes.

Worst Is Over.

Slowly but surely business conditions are improving. In the East where the depression was the worst, close observers report decided improvement.

"Business is picking up in the Mid-

dle West, and the rest of the country ought to fall in line shortly," declared Henry Ford in a statement given out March 9.

"The worst is over," said Mr. Ford. "With the country getting back to work and people beginning to buy, it will not take long for the situation to better. Of course, it will be different from the conditions before the war. There will be more measures of economy in every way, but the volume of business will continually grow.

"Our factories are turning out at present about 3,000 automobiles and 200 tractors each day, which is pretty nearly the pre-war schedule even with the smaller number of men employed. I expect the demand to increase just as regularly as it did before 1917."

Estimates from a reliable source place the number of men at work in the Highland Park Ford plant at about 24,000 men and at the Rouge plant at about 6,000 men.

Mr. Ford called attention to a statement, made in New York, that there would be a probable demand for about 400,000 tractors during 1921 in the United States alone, and that within the next ten years there would be sales of about 10,000,000 tractors. There were about 325,000 tractors in use in the United States at the end of 1920, it was estimated.

The same statement also estimated that Argentina would want during 1921 some 200,000; Continental Europe, aside from Germany and Russia, about 400,000 tractors.

Mr. Ford believes the estimates are not excessive and looks for the same volume of business in all manufacturing lines.

The readjustments are still being made in various lines and by some it is expected that they will not be completely made until we are well along into 1922. Be that as it may, it is indeed reassuring to know that the automobile industry was one of the first to begin making readjustments and has passed through the worst of the slump, according to those in position to speak authoritatively.

Helping Others to Help Themselves

Accessory Dealers Are Specialists—They Should Be Able to Serve Car Owners Better Than Other Business Men Who Are Not Specialists—See If Service Intelligently Rendered Won't Make a Difference in your Annual Profits

By Robert Falconer

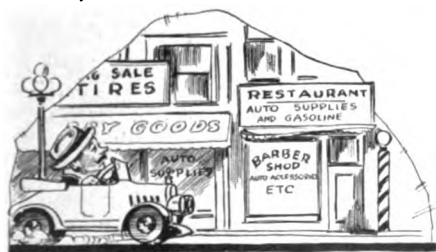
One only needs to glance through the hardware, the electrical, and the blacksmithing journals to get an idea of how much competition the automobile accessory dealer is facing.

Hardware stores are taking a greater and greater interest in automobile accessories. Some of them carry complete stocks. Dealers in electrical supplies are adding more and more automobile accessories to their stock. With horses becoming scarcer, the blacksmith is turning more and more to the automobile industry to make the profits that are needed to keep his business going.

In the old days, these business men paid little attention to automobiles and automobile accessories. Today, they are all anxious to get their share of the profits. In each case, however, the accessories are carried as side-lines.

Some dealers in other lines are able to make a success of a side line of automobile accessories on account of the reputations that the dealers have created. People have learned to rely upon all goods purchased at these stores and purchase their automobile accessories there for this reason. This is especially the case in the tire business, if the town has been very badly afflicted with "gyp" dealers.

Now the automobile accessory dealer has very little to fear from these hardware dealers, electrical supply dealers, blacksmiths and all the rest,



There Seems to Be a Mania for Carrying Automobile Accessories as a Side Line.

if he can create the right kind of goodwill for himself. He has no more to fear from them than the haberdasher has to fear from the department store.

The automobile accessory dealer is a specialist, and for this very reason should be able to render a far better

service to the car owner than any other business man who does not specialize in accessories. It all depends upon how successfully he can gain the confidence of the car owner.

Accessory dealers, who have made the greatest successes, have not done so by cutting prices. They have not done so by watching any of their competitors. They have done so by giving the very best possible service to car owners. They have done so by helping car owners get more out of their cars.

In the past it has not been necessary for an accessory dealer to pay very much attention to building up a reputation for specialized service. There were not enough other lines of business handling accessories to make this necessary. Every car owner naturally looked upon the accessory store as the only place in town where he could buy what he wanted. Now, however, things have changed.

One day during a ride of less than a mile along a suburban business street, one or more tires were seen on display, first in a grocery store, then in the office of a baggage express and household furniture-moving company, and next in the window of a grain dealer. All three of these concerns were trying their luck at selling tires. Near the grocery store was a drug store with a hardware store annex in which were sold some automobile accessories. In practically any sort of store, one is likely to find some kind of an automobile accessory for sale, these days.

In most cases these stores give poor service and the purchasers of the accessories are not entirely satisfied with what they have bought. There, at present, seems to be a mania for carrying automobile accessories as side lines. It would appear that retail dealers in any line, who are not making a success of their businesses, have a feeling that all will go well if they just stock a few automobile accessories.

This condition of affairs makes it all the more important that the automobile accessory dealer pay more at-

tention to service to the customers.

Service in the sense in which it is used here means making it easier for the customer to buy from him than from any one else. This, in turn, means keeping the car owner fully informed in regard to the accessories that can be added to his car which will result in greater economy of op-



"He Pays Over All His Money, Signs a Few Notes, and the Car Is His."

eration, greater comfort, or will give the car other advantages.

One way in which this can be done is to list the car owners who are already customers or prospective customers, according to the make of car that they drive. If, then, these car owners are kept fully informed in regard to the accessories that are suitable for their cars, it will be a real service to them.

A man who drives a Ford is not especially interested in accessories that can be used on a Packard, but cannot be used on a Ford. The man who owns a Packard is not deeply interested in accessories that are suitable only for a Ford. If mail matter is sent to both of these owners featuring all kinds of accessories, the resulting sales are pretty sure not to be so great as would be the case if the attention of the owner of the Ford was brought to that part of the stock which is of special interest to the owner of a Ford and the attention of the Packard owner was brought to that part of the stock which is of special interest to the Packard owner.

In the first case, it is not so easy to decide upon purchases as it is in the second case. Where the whole stock is featured, the car owner is far more likely to overlook the things he should have for his own car than he is if nothing but the things he can

use are featured. This sort of specializing pays in two ways. Less printed matter is required and the customers are impressed with the careful attention the dealer gives to their wants.

It is a fact that people spend their money where it is easiest to spend it. The reason why people have bought as many automobiles as they have is largely due to the fact that it has been made easier for one to spend his money for an automobile than to put it in the bank, buy safe securities, or to buy a house.

When a person wants to open a savings bank account, he may be forced to stand in line for several minutes. In any case he will have to stand cross-questioning and admit many things about his past life and the life of his ancestors. It's hard to open a savings bank account. It requires a person of real courage to do so. Hence the fact that no more people are opening accounts.

A person with money to invest in securities is in a serious dilemma. Only the bad ones are advertised to any great extent. He knows, if he is wise, the securities and the brokers to avoid. They are usually the ones who use the largest advertising space and are always sending him very promising literature. The problem is

to find the safe security and the honest broker. These are often hidden under a bushel in the dark.

The process of buying a house is so complicated and burdensome that the average person never buys more than one, and then he advises all his friends not to make the mistake that he has made.

When it comes to buying an automobile, however, how different it is! All of the best automobiles are so well advertised that even the children in the family can talk intelligently about them. When one enters an automobile display room, he is greeted with a smile. Before he leaves, he pays over all the money he has with him, signs a few notes and the car is his.

He also has a convenient place to put his savings—and it is all so easy. In fact, he likes it so well that in a short time he sells this car and buys another. He may buy but one house, but he would never think of being satisfied with but one car even if that car would last him a lifetime. It is too easy to spend one's money for an automobile to think of being satisfied with one for a lifetime.

The problem of the automobile accessory dealer is to make the purchase of accessories anywhere else appear as much harder than buying from him as opening a savings bank account,

making safe investments, or buying a house, is harder than buying an automobile. When this is done, the dealer will rapidly acquire the goodwill and the patronage of car owners.

It is just a case of making it easy for the car owner to spend his money at the dealer's and, by giving satisfactory service and satisfying all customers, making it increasingly easy for people to spend their money at the store. One way of doing this is by keeping the name of the dealer before car owners, making it easy for car owners to remember the dealer and his place of business.

The most effective way is to suggest to all car owners the specific accessories that will prove of special service to them. In other words, make it easy for them to decide upon what to buy.

If this policy is followed for any extended time with judgment and honesty, car owners will begin to rely upon that dealer for advice. He will have built a class of goodwill that no dealer handling accessories as sidelines will be able to build. He will be as far removed from the sidelines store as the specialist is from the general practitioner—and there will be about the same difference in the annual profits at the end of the year.

A Service Station that Is "Different"

Good Example of Efficient Service in New Chandler Service Station in Providence, R. I.—Number of New and Interesting Features—Customers Appreciate the Provisions Made for Handling Work Rapidly and Their Comfort

By J. E. Bullard

When the car owner drives up to the door of the new Chandler service station on Pearl Street, just off Broad Street, in Providence, R. I., and blows his horn, the doors immediately swing open and permit him to drive into a commodious enclosure. Before him there is the closed door of the shop and, at the left, the office.

Above a writing ledge, the office partition has windows extending the full length of that side of the office. At one of these windows the motorist leaves the directions in regard to what he wants done with the car or tells what seems to be wrong with it. If he is going to leave the car there, he can then depart and return when the

car is finished. There is no waiting and no inconvenience.

If it happens that he desires to wait until the work is completed, he is ushered down a hallway and into a well-lighted and neat writing room connected to the office by means of a glazed door. On the floor of this room there is a rug. Comfortable chairs and a table of magazines make it possible to easily while away the time he must wait.

All is comfort, cleanliness and cheerfulness. In case he thinks of something that he has forgotten, all that he has to do is to step to the door between the office and the waiting room, open it and give any further directions in regard to his car, ask for

any information he may desire, pay a bill or transact any other business he happens to think of.

It is so comfortable and pleasant in this room, and he is in such close touch with the manager of the station, that the chances are that he will never think of going into the shop to superintend in person the work on his car. When a concern watches out for the comfort of car owners to the extent that this one does, it is the most natural thing in the world to conclude that they will do the right thing for the car.

Should he happen to decide to wander into the shop, however, he will find the door to that room locked. Both the large door through which

the cars are driven and the small door used by the employees in entering and leaving the shop are locked on the inside. The large door is controlled by hand while the lock on the small door is operated either by a key or by push buttons. Both doors can be opened readily from the inside.

Push buttons in the office and the stockroom operate a bell in the shop by means of which the shop superintendent can be signalled that there is a car in the driveway waiting to be driven into the shop. A workman then opens the door into the shop and the car is driven into the workroom.

The shop is a large, well-lighted room. In fact, it is so well lighted that even on a dark day little if any artificial lighting is required. There are six large skylights in the roof and windows on three sides. The walls are painted white.

Along the rear and the left walls run workbenches. In the corner between the rear and the left walls, is the desk of the foreman, this being the most convenient location in regard to the distance the men must travel in order to reach his desk.

The floor of the shop is level and free from pits. Elevated runs are used when work must be done beneath the cars, because these runs give

The washstand is in the front of the building, next to the street wall and just to the right of the driveway wall. This is equipped with an overhead reel and is well-lighted from the windows during the day time. The building is

stockroom are at the left of this horizontal reversed arm of the L and the shop and driveway are in the main arm.

The front door which slides open so magically at the sound of an automobile horn—and with no one near it—is operated by a little motor up in a corner above the door. There is a button in the driveway, one in the office, and one in the stockroom which controls this motor. When a horn sounds outside of the door, the man nearest a button presses it and the door immediately opens. After the car has entered, another button is pressed and the door closes. There are, it is said, no other service station doors



Just Off "Broad Street" is the New Chandler Service Station in Providence, R. I.

equipped with Grinnell sprinklers for fire protection; there is a sanitary drinking fountain for the workmen; and a flight of stairs leads from the shop to the basement under the office and stockroom.

In this basement there is a locker room for the men, a toilet, a washroom, and a shower bath. The heating plant and coal bin also occupy this basement, as well as the oil tanks which are equipped with a windlass for handling and emptying into the tanks, full barrels of oil.

The remaining space is utilized for storing bulky stock, such as fenders and other large parts. The stockroom proper is across the hallway from the office on the ground floor, and extends from the shop partition to the left exterior wall of the building. This room has but one door which is always kept locked. It, however, has a service window opening into the public hallway and another opening into the shop. Therefore, both the public and the shop may be served with the least possible effort on the part of the stockroom man.

The building itself is of an L shape, with the horizontal arm of the L coming up flush with the building line of the street and extending to the left rather than the right of the vertical arm. The office, waiting room, and

in the city operated like this, and for that reason this door is attracting a great deal of attention.

An attempt has been made in this station to reduce bookkeeping work

JOB NO.		Date	
Name		Business Address	
Home Address		Phone	
Meter No.	Lenses No.	Speedometer	
INSPECTION MOTOR Valve tightness Valve adjustment Carburetor adjustment Fuel system Vacuum system Spark plug points Breaker points Spark timing Cables, straps Radiator connections Fan belt Current operation Voltage regulation Tight connections Cool circulation Starter operation Battery condition New oil in motor CLUTCH Clamping Adjustment Lubrication GEAR BOX Lubrication Adjustment DRIVING MECHANISM Universal lubrication Adjustment level gears Lubrication Brake adjustment Wheel bearing adjust Wheel bearing lubricat. Handbrake lever & Tire condition Synchronizer testing Spring lubrication All nuts and bolts tight			
When presented		Tested by	
Work authorized		Work accepted	

A Complete Record—It's Made in Triplicate.

on the part of the shop and stockmen to the minimum and, at the same time, keep an accurate record of all material and work. The orders for stock that is needed in the stockroom are made out in triplicate in the stock-

JOB NO.	DATE
NAME	
ADDRESS	
PARTS	LABOR

Envelope Contains All Data and Records.

freer motion to the man or men working on the car and also make the lighting conditions very much better—two things that are very important if the best work is to be done in the shortest time.

room. The original, after being approved, is forwarded to the jobber or the manufacturer from whom the stock is purchased. The triplicate is held in the stockroom for a record of the order and the duplicate goes to the bookkeeper. As a result, a complete record is kept of all orders, both by the stockroom and the office, simply by filling out the original order. To guard against any order being overlooked, all these forms are numbered.

In the stockroom the usual perpetual stock record is kept, and to facilitate the finding of stock all the bins are numbered, the number in which the stock will be found appearing on the stock record card.

Job cards are also made out in triplicate. In this case the original goes into an envelope in which all the forms and orders used in connection with that job are finally collected. The duplicate goes on file in the office and the triplicate, which is on white cardboard, goes into the shop.

The job card shows the job number, the name, home address, residence and business telephone numbers of the owner, the motor number, the license number, the speedometer reading and the date. Under the heading "Inspection," there is a column of operations printed at the left of this sheet in four

different groups or classifications as follows:

Eighteen operations are listed under the heading of "motor," three under the heading "clutch," two under "gear

If you would inform, a positive and dogmatical manner in advancing your sentiments may provoke contradiction and prevent a candid attention. If you wish information and improvement from the knowledge of others and yet, at the same time express yourself as firmly fixed in your present opinions and modes, sensible men who do not love disputation, will probably leave you undisturbed in possession of your error. And by such a manner, you can seldom hope to recommend yourself in pleasing your hearers, or to persuade those whose concurrence you desire.—Benjamin Franklin.

box," and eleven under "driving mechanism."

This list is used especially for tuning-up new cars. It prevents the overlooking of anything. To the right of this column is a space for special written instructions in regard to the work to be done on the car.

At the bottom is noted the time delivery is promised, the signature of the person authorizing the work, the signature of the person accepting it,

and the signature of the person who tested it.

The workman's time is kept by means of a time clock, both in regard to the number of hours he works during the day and the number of days he works on any particular job. This eliminates any guesswork on the part of the workman, and does away with the necessity of his writing down any figures which it may be rather hard to read later.

All shop requisitions on the stockroom are made in duplicate. One is held with the job card in the shop and the other in the stockroom. All the records in regard to time, material, orders, etc.—that is one set of them—are gathered together and placed in the job envelope, so that nothing will be missing when the bookkeeper figures up the cost of the job.

Kenneth C. Grinslade, manager of the Chandler Motors of Rhode Island, Inc., and Mr. Andrews, the manager of the service station, both pride themselves upon having about the best service station there is in the state. Every effort has been made not to overlook a single thing that would make the station more modern or more efficient. An inspection of the station leads one to believe that this effort has met with marked success.

A Feller Is Paid for Doing His Best

I Figgered It Wasnt Enny of the Bosses Bizness What I Oed But He Sez It Is—The Man That Doesnt Settel His Bills Loozes His Good Reppitashun and Proibly Goze Kerflewie—Bob Sez he Thinks the Boss Is Rite

By Frank Farrington

Deer Pete:

I thought yesterdie Ide proibly be cumming back to Pinkvill looking for a job becaws the boss called me to cum into the offis when he was there alone and I cood see by his looks that he wassent going to offer me enny raze in wages or ennything.

He sed, "William, heres a bill for leven-ninety-ate from Joplins cafay and Joplin says you wont pay it and he wants me to take it out of your wages. What is they about it? I told him Ide see you about it."

Gee he had me where the hair was short becaws I oed that bill and Ide oed it a good while and I diddent hav enny 11 bux to pay it with. I told him I oed the munny. I diddent tell him I oed sum other bills too becaws

Ide got a new sute and sum other things and I diddent seem to get enuf ahd to pay fokes. This h. c. l. razes h. e. l. Ile say. Old Joplin mite of knone Ide pay that bill. Heez so darned afrade heel looz a sent.

Just as I was wondering how to get out of the hoal the boss asks me, "Is that all you oe?" I told him I oed sum other bills but I was figgerin on paying em pretty soon. And the first thing I new heed found out all about what I oed and who I oed it too.

Firsf it diddent seem to me it was enny of the bosses bizness if I oed or diddent, but then he said, "Now, William, I kno you think this issent enny of my affare, but it is. When men working for me get in det and cant settel, the fellers they oe to get sore

and they try to get the munny from me. If I wont help em get it they get sore at me and take it all around I looz out becaws those fellers stop givving me their bizness.

"A garaje with a lot of the help that dont settel their bills is bad for the bizness. Now why don't you tell Joplin Ile see he gets his munny and then Ile take a cuppel of dollars a week out of your pay till heez fixt up?

"Its a fine thing to be abel to get trusted and it shoze a mans got a good reppitashun but whats going to happen if he doessent settel? Then he cant get trusted enny more and he loozes his good reppitashun and proibly he goze kerflewie. I can see how eezy it is to get in the hole and Ile help you get cawt up if youll agree to

stay cawt up. When you dont hav enuf munny to pay for a thing, cum to me and get an advans. I kno sumtimes a feller reely needs to get trusted and needs things before he gets the cash."

So insted of getting fired Pete and cumming back to old Pinkvill Ime all rite again—or I will be when I get cawt up once and I guess that'll take a while but I feel better becaws Ide bin worrying a good deel about how I was going to get out of my dets.

I told Bob about it and he sed, "So you see youre working for a white boss even if you do think sumtimes heez pretty cranky. Now you'll buleve men when I sed heez the best man to work for I ever had. Ide of helpt you f youd askt me. You see heez rite that a feller can dammij the bizness by what he does on the outside thats rong as well as by what he does in the garaj thats rong."

I sed that was all rite but I thought a fellers time was his own when he was out of the garaj and off the job and he cood do what he wanted to only I cood see it wassent rite to go and get in det so you coodent settel up.

And Bob sed, "Now you be a littel

careful how you go around hollerin that when you get out of the garaj your times your own and you can do ennything you like with it. I dont agree to all that. He says you can do what you want to with your own time as long as it doessent keep you from being just as good a man for the boss."

"What do you mean?" I askt Bob. "Whats the boss got to say about what I do out of working hours?"

"Well it's like this," says Bob. "If you leev heer at nite and go and hang around until haf the nite and then get up in the morning so tired that you cant do your work rite, aint it sum of the bosses bizness that you diddent go home and get a good nites rest? Heez paying you for doing the best you can and when you dont do your best, then he loozes. Aint it so? So if a feller goze and does things outside that makes him poorer help or

makes him mebbly get crookid so heed steel from the boss, Ide say its the bosses bizness all rite."

Say Pete thats sumthing Ide never thought about before had you? I gess the boss pays a feller for sumthing moren just so many hours time every day. He pays him for doing his best just like Bob says.

I cooden help saying to Bob that I gess that rool diddent work on Dazie our exqwisit stenografer in the bosses offis, becaws he goze and takes her out himself and keeps her one-stepping and high-stepping around town all hours of the nite so she cant be very good on her job the next day, but Bob says the femail of the speeches is more tuffer than the mail and enny-

other day and o smush! Ide rather reed the garaje and auto deeler thats got sum sense in it and that tells a feller how to be a bizness man and sell automobeels and fix em rite and all the things he wants to kno about the bizness.

Your frend BILL.

Automobile Mechanic Licensing Proposed in Nine States.

In nine of the 40 state legislatures now in session bills have been introduced providing for examining and licensing, and, in some cases, classifying automobile mechanics, or licensing garages and repairshops. It is said that other state legislatures are likely to follow their lead before adjourning.

The nine states in the legislatures of which the bills are being considered are: Arizona, Colorado, Connecticut, Idaho, Illinois, Minnesota, Nebraska, North Dakota and Texas.

In general, the bills provide for establishing a board appointed by governor, secretary of state, motor vehicle commissioner or department of public works to examine and license me-

chanics, and forbid others to work on automotive equipment except as helpers to licensed mechanics; fix license fees varying from \$2 to \$10 and fines for violations from \$10 to \$100.

The Idaho and Minnesota bills are different, licensing the garage or shop, instead of mechanics, requiring a bond from the proprietor to protect judgments for damages to equipment worked upon.

In sending out a bulletin on the subject, the National Automobile Chamber of Commerce makes the comment "Better service is the worthy aim of legislators but is legislation the best means? Service department invites comment." And it has issued a questionnaire to service managers with a view of obtaining their opinions as guidance in the attitude it should take toward such legislation.



Just As I Was Wondering How to Get Out of the Hoal the Boss Asks Me, "Is That All You Oe?" First Thing I New Heed Found Out All I Oed.

way all we got to think about is our own jobs and not Dazies and he thinks the boss is going to marry Dazie before long and then she will be doing her one-stepping down to the grocers.

Well I gess it wood be a good thing if they got marrid becaws I notis it takes the boss about twice as long to dicktait his male as it used to take and he sits so close to the tiperiter that he mite about as well be running it himself, and sum of the letters I take to the P. O. is directed bottom side up and stampt on the rong corners and if its luv that gets the tiperiting all shot to peeces, why dont they get marid and forget it?

Pete was you ever in luv? Dont it give you a pane to see grone up men standing around waiting for sum pie-faced dame with a stickup noze to tell em where they get off at? Say I got a luv storie out of the libry the

Accounting:

Another of the Series of Articles on Garage Accounting, Describing the Accounts Which Comprise the Chart of Accounts—When to Credit Accounts and When to Debit Them—Have You Any Suggestions or Questions to Offer?—The Chart Again—Quiz Questions

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting

A study of the various items presented in the tentative chart of accounts is most important. For that reason an analysis of the accounts comprising the assets' division of the chart is given in the following:

Bank: In connection with your cash account, you will carry a bank register or bank registers to keep a memorandum account of deposits and checks on your bank or banks. This memorandum should be checked at regular intervals with bank statements to prove the accuracy of your cash balance.

Cash: All cash receipts are posted a debit to the cash account. Cash receipts are from customers, from sundry debtors, from cash sales, from borrowers on notes, from banks on notes payable, from finance corporations on notes and accounts receivable discounted, cash returns on allowances, rebates, or credit memos from vendors.

Cash on hand at the start of business is debited to the cash account. Checks are to be drawn for all cash

payments other than those made out of petty cash. Checks are drawn at convenient intervals to reimburse petty cash. All checks drawn are posted as a credit to the cash account.

The difference between cash debits and cash credits will always be your cash balance, your cash on hand and in the bank.

Petty Cash: All currency items set aside for the use of, or to reimburse petty cash, are posted a debit to petty cash. All payments made from petty cash—in other words, disbursements in currency are posted a credit to petty cash. The difference between the

debit and credit of petty cash should at all times be the amount of actual cash in the petty cash drawer or fund.

Liberty Bonds: This account is debited with par value of all Liberty bonds received. It is credited with par value of all bonds disposed of. The difference between debits and credits will be the amount at par value of the bonds on hand.

Premium and Discount on Liberty Bonds: It is suggested that this account be carried, to which will be posted the difference between par value

to these accounts. Very often postage stamps, revenue stamps, etc., are charged direct to expense. This method, though more convenient, is not correct and is not advised when the amount involved is considerable.

Notes Receivable: This account is debited on receipt of notes issued in your favor and is credited with the amounts paid on such notes. The difference between the debits and credits will show the balance due on notes receivable.

Notes Receivable, Discounted: It is common practice to show the amount of discounted notes as a deduction from notes receivable, the balance showing the amount of notes receivable held by the firm.

We believe the best practice for the garage owner to follow is to carry "notes receivable discounted" as a liability to be cleared at the same time as notes receivable. That is, notes receivable would be credited and notes receivable discounted, debited when you have been notified that

discounted notes receivable have been paid.

Allowance Doubtful Notes Receivable: This account used to be carried among the liabilities in the so-called reserves division, but modern book-keeping practice places it among the assets as a deduction.

Credit this account by amount of estimated uncollectable notes on hand. Debit this account when any portion of this account is written off to bad debts, or when any amount already credited is found to be collectable.

Accounts Receivable: This account is sometimes called "customer's ac-

Assets:	Liabilities:
Bank.	Notes payable.
Cash.	Accounts payable.
Petty cash.	Notes receivable discounted.
Liberty bonds.	Deposits payable.
Postage stamps.	Pay roll.
War saving stamps.	Accrued payables.
Notes receivable—less allowance for doubtful.	For a corporation:
Accounts receivable—less allowance for doubtful.	Capital stock.
Deposits receivable.	Surplus.
Merchandise—less allowance of depreciation.	Profit and loss.
Unfinished jobs.	For an individual or partnership:
Shop equipment—less allowance of depreciation.	Investment.
Office equipment—less allowance of depreciation.	Undivided profits.
Buildings and real estate—less allowance of depreciation.	Profit and loss.
Investments.	
Deferred charges to expense.	
Income:	Expenses:
Sales.	Service.
Cost of sales.	Sales.
Other income.	General or administration.
Additions to Income:	Deductions from Income:
Interest earned.	Interest allowed.
Discount earned.	Discount allowed.

Chart of Accounts Gives the "Present Worth" and "Results of Operations."

and purchase price on purchases, and par value and sales price on sales of Liberty bonds. This account will be charted under "Other Incomes" or under "Other Deductions" according to net profit or loss shown.

War Savings Stamps: This account is debited when War Savings stamps are purchased or received and credited when they are sold or issued. The difference between the debits and credits will represent the amount of War Savings certificates on hand.

Postage Stamps, Revenue Stamps, Etc.: The preceding remarks on War Savings stamps are equally applicable

count" and the ledger where such accounts are carried, is generally called the sales ledger. It shows the amount of customers' indebtedness to you.

It is debited with all charges against the customers and credited with all moneys received on account or credits of any kind allowed customers. The difference between the debits and credits on the account shows you the amount due you from customers.

Allowance Doubtful Accounts: The remarks on the account "allowance doubtful notes receivable" apply equally to this account, and the treatment of the two accounts is practically the same.

Suspense: When any customer's account becomes doubtful of collection, the proper way to do is to separate it from the regular accounts and put it in a section called "suspense" where it will receive special attention. The amount credited to "allowance doubtful accounts" is based on the amount of accounts receivable carried in suspense.

Deposits Receivable: Parties or concerns indebted to us for deposits on cars, parts, or contracts are listed under this account. It is usually carried with concerns from whom you buy the most.

This account should be kept separate from the open purchase account, which represents a liability, while "deposits receivable" represents an asset. The account is debited with the amount of money deposited and is credited when this amount is returned in cash or by contra account or credited with partial return of the original deposit.

Sundry Debtors: This account represents other receivables than those previously listed—accounts with members of the firm, with employees or with others outside the business who may owe for personal advances. It is the usual practice to carry salesmen's accounts by themselves where they are of any number.

This account is treated in the same manner as "accounts receivable." Debit for moneys or values advanced and credit for payments on account or credits allowed. The difference between the debits and credits of the account is an asset and shows the amount due you from sundry debtors.

Merchandise: This account embraces all commodities purchased for resale. Speaking generally, we debit merchandise with the cost of goods purchased or received, and credit merchandise

with the cost of goods sold or issued. The difference between the debit and credit of this account will show the value of merchandise on hand or, in other words, the inventory.

Allowance Depreciation: It is a question for debate whether a merchandise account should carry depreciation. It is possibly good bookkeeping practice to set up depreciation on such accounts as new cars, used cars, trucks, tractors, etc.

Work in Process: This account is usually considered a special account and is taken into our bookkeeping consideration only at accounting periods.

We debit this account with the cost of labor, merchandise, and supplies that go into unfinished jobs and credit

THE CHANCES TO RISE.

It is the fashion to say that young men in the days of old had a better chance to rise. I say they have a better chance now to rise, and they can rise higher through industry, integrity, honesty and intelligence, judgment and determination. There is no better way of building character than by meeting obstacles and overcoming them.—John J. Glessner.

the account with the cost of all completed and billed jobs. The difference between the debit and credit of this account will show the amount of investment in unfinished jobs.

Shop Equipment: This account represents investment in tools, machines, tanks, engines, shaftings, pulleys, wash rack, hose, battery-charging equipment, cranes, welders, vulcanizers, etc., and sometimes service cars, although it is better practice to carry service cars in a separate account.

The account is debited with the cost value of all purchases on receipts, and credited with cost value of all sales or issues, items lost or destroyed, and an amount to take care of depreciation written off. The difference between the debits and credits is an asset and is the inventory value of shop equipment.

Allowance Depreciation Shop Equipment: This is a liability account but is charted after the asset account "shop equipment" to present the net results. This account should show the estimated amount set up to anticipate losses by depreciation on tools, jigs, and dies, machines and shafting, benches and cabinets, tanks, hose, etc., small tools, although part of shop equipment need not carry depreciation, but this depreciation should be charged

off directly to the small tool expense.

Office Equipment: This account is similar to shop equipment, except that it applies to the office rather than to the shop. The account is debited and credited in a similar manner and the balance is an asset and represents the value of the inventory.

Allowance Depreciation Office Equipment: This should show the estimated amount set up to anticipated losses by depreciation on desks, chairs, clocks, safes, registers, files, carpets, binders, sheet holders, railing and partitions, typewriters, adding machines, etc. Depreciation should be estimated on each item separately.

Salesroom Furniture and Fixtures: This account is similar to "office equipment," and the remarks on that account apply equally to this account.

Allowance Depreciation Salesroom, Furniture and Fixtures: Remarks on "allowance depreciation office equipment" are equally applicable to this account.

Buildings and Real Estate: This account represents your investment in what is commonly termed property.

The account is debited with the cost of all property acquired or buildings or additions added to original holdings. It is credited with the cost of the sale or disposal of any properties or parts of properties, or with the value of the damage done by fire, storm, etc. The balance on this account will represent the cost value of the buildings and real estate on hand.

Allowance for Depreciation on Buildings: This account should show the estimated amount set up to anticipate losses due to depreciation of buildings. Depreciation should be estimated on each unit separately, depreciation depending on the structure of the building, wooden, cement, reinforced, etc.

The government income tax reports suggest reasonable allowances for depreciation which it would be well to adhere to as closely as possible. In other words, you must have a reasonable explanation for the percentage used in setting up your depreciation.

Investments: This account generally represents your investments in stocks, bonds, and securities. The comments on "Liberty bonds" are applicable to this account.

Deferred Charges: These consist of unused or prepaid insurance, rent, supplies, interest, etc. The balance on this account represents an actual

(Concluded on page 22)

MY DON'T IT GIVE YOU A THRILL

WHEN YOU
COME TO
WORK FEELIN'
THE DULLTIMES -

①



AND YOU GET A
LETTER WITH A KICK
IN IT FROM A CUSTOMER

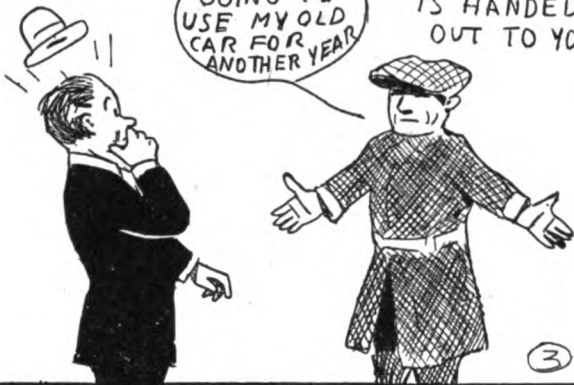
②



I'M
GOING TO
USE MY OLD
CAR FOR
ANOTHER YEAR

AND THIS
IS HANDED
OUT TO YOU

③



AND YOU
READ YOUR TRADE
PAPER AND
TAKE HOPE

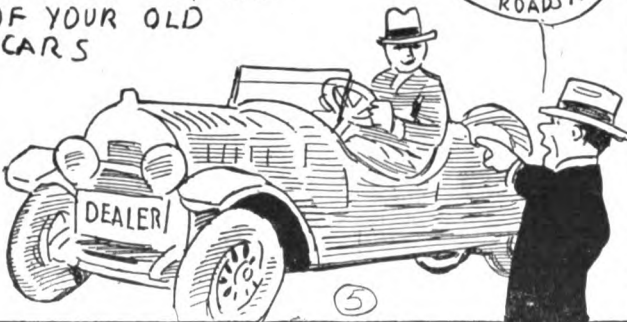
④



AND A PROSPECT
WANTS TO BUY ONE
OF YOUR OLD
CARS

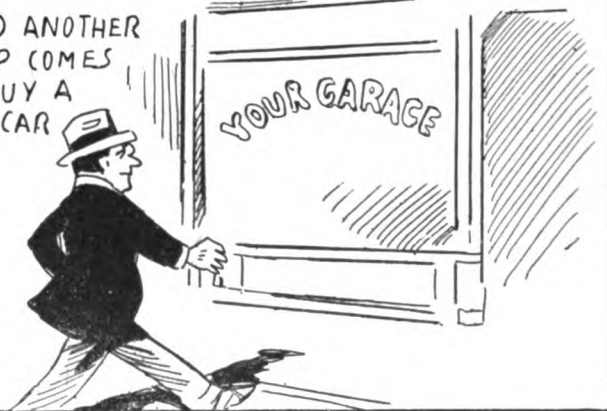
WHAT
DO YOU WANT
FOR THAT
USED
ROADSTER

⑤



AND ANOTHER
CHAP COMES
TO BUY A
NEW CAR

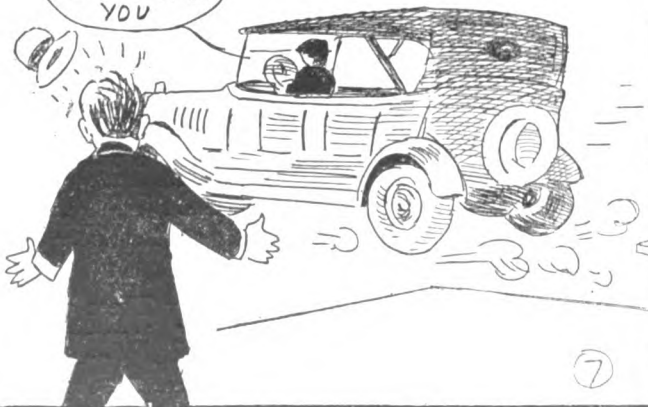
⑥



I MAY
SEND ANOTHER
CUSTOMER TO
YOU

AND HE FURTHER
CHEERS YOU UP

⑦



AND ITS A
THRILLING
SENSATION
TO FEEL THE
RETURN TO
NORMAL
TIMES

⑧



Highway Law and the Garage Owner

Liability in Case of Accident Causing Damage to Property or Person—Safest Rule: Require the Greatest Care and Caution from All Employees—"Law of the Road" Must Be Regarded Now—Instances Where Liability Ceases

By Chesla C. Sherlock

Garage owners are probably in more frequent contact with highway laws than any other business men. They have delivery cars and trucks in more or less constant use, and not only that, but their employees are driving cars on the streets almost constantly.

It is well to understand what the liability of the garage owner and employer is, in case an accident occurs causing damage to the property or injury to the person of another. In some sections of the country the most reckless drivers upon the public highways are the helpers and employes of garages. They seem to have an inborn desire to burn up the road. If anything goes amiss, is the employer liable for their recklessness?

Fifteen years ago little attention was paid to the "law of the road." Automobiles were comparatively unknown and such deliveries or errands as had to be performed were left to the staid old horse and wagon, to boys on bicycles. The advent of the automobile has not only caused a great change in the methods of delivery, but it has also caused a widespread growth in the highway law. Old rules have been strengthened or discarded entirely. Today we have a very thorough system of legislation and court opinions covering the use of the automobile on the highways, and defining the rights of every person relating to it.

The Arkansas Supreme Court has very wisely said that the man driving an automobile does not have the right to the whole road; that the beggar on his crutches has just as much right upon the public highway as the motorist.

The Iowa Supreme Court has issued the injunction to all drivers to drive in a careful and prudent manner, and to drive at all times in such a way that the life or limb of any person will not be endangered.

Delivery boys and truck drivers often entirely disregard these rules. They are very busy persons and very often are in a big hurry to get their work done. Where there is haste, there is nearly always carelessness. Careless-

ness is very apt to result in a disregard of the rights of others; frequently it leads to disasters and accidents.

But the mere fact that delivery boys are very busy fellows and in a hurry, will not excuse the employer from liability for any accident they may experience. It makes no difference to the courts whether the faulty person was in a hurry or not. The fact that the employer had given orders to his drivers to use caution will not excuse him from liability, unless the disobedi-

Buy But Do Not Squander!

If there are nice things you want to buy, and they are necessary, buy them; but do not squander your money—save it. How can one be ready for the glorious opportunities ahead of him unless he has cultivated the habit of economy and prudence? He must save all he can in season and out of season.—John D. Rockefeller.

ence of his orders was such as to take the driver out of the course of his employment at the time of accident.

While the delivery boys are engaged in the employer's work or trade, they are his agents and, as such, bind him for every act that they do, however injurious it may be. As his agents, they may cause accidents in which the employer had nothing whatever to do, but liability may attach to the employer just the same.

Drivers may run into a pedestrian on the streets; they may frighten horses and cause them to run away; they may run into another car or vehicle, causing damage; or, in some cases, by recklessness, they may cause two other persons to collide, all of which would be taxed up against the employer.

The liability of the employer does not end here. People may be invited to ride in the delivery car, and if the driver by recklessness or carelessness, causes injury or damage to them, against their protest or will, the employer may be held liable to them for the injury or damage they sustain.

There are certain instances, how-

ever, where the liability of the employer will cease, even though the driver is apparently in his employ and using his car at the time of the accident. For instance, if a driver takes out a car against the orders or knowledge of the employer and is engaged in an errand of personal benefit at the time of the accident, the employer will be relieved of liability.

Then again the driver may be engaged in his regular duties for the employer, but do something which, at the time, takes him temporarily out of his regular employment, and if an accident occurs, the employer will not be held liable.

As to the liability of the employer, that is largely a matter for the courts and juries to decide. It will depend, in no small degree, upon the nature of the damage done, and the circumstances surrounding the case. It will depend also upon the whim of the individual jury. One jury might be drawn that would measure the damage in hundreds of dollars, while another jury sitting on the same case would measure it in thousands.

If the injured party is in the employ of someone else, he may either sue for damages, or he may recover compensation for his injuries from his employer, under the workmen's compensation acts. His employer would then be subrogated to the injured man's rights and have the legal right to recover from you the amount he had lost.

If the injured man does accept compensation from his employer, he can not recover damages from you also. Only the employer or his insurance carrier can do this. On the other hand, if the workman does recover damages from you, he can turn around and sue his employer for compensation, if the amount received from you does not equal the full compensation allowed under the law.

There is only one safe rule. That is to require all drivers in your employ to exert the greatest care and caution at all times. Then rigidly enforce these orders.

Build Business with Electric Signs

Electric Display Signs Give Impression of Quality — Featuring Maker's Name Pays — The Different Types of Display Signs Described — Cost of Maintenance is Surprisingly Small — Electrical Advertising a Real Art

By C. B. McCuaig

Back in his private office above the showroom where the noise of the service station came only as a far off melody of industry, the Boss was having a session with Old Gus Gloom.

"It's rotten I tell you", he declared to the man on the other side of the desk. "We haven't sold a car in a week and the floor downstairs is as deserted as a cemetery. What's the use in telling me to cheer up when things are like that?"

"My business wouldn't be good either if I sat back and waited for it to come up and kick me in the nose," said his friend, the manager of a downtown moving picture theater. "Now I'll tell you some things about my business which may have some bearing on yours."

"Do you remember, a few years ago, the number of little hole-in-the-wall movie theaters

there used to be scattered about the city? Well, where are they now? Mighty few of them left. They have either died a natural death or have been bought up by some of the larger syndicates.

"What's the reason? Simply that the men who ran them were not big enough to take in the conditions that confronted them. They were on a side street somewhere up town and they simply counted on the neighborhood business that came to them. They hung out a few colored posters and thought they were telling the people their story.

"The bigger houses downtown soon

learned that the movie game was no place for the modest violet. We had to advertise—and the more noise we made, the better. We advertised in the place where it would do the most good—right at the door of the theater. It wasn't long before I had the whole front of my place covered with electric lights. Did I stop there?

kind of an electric display to install.

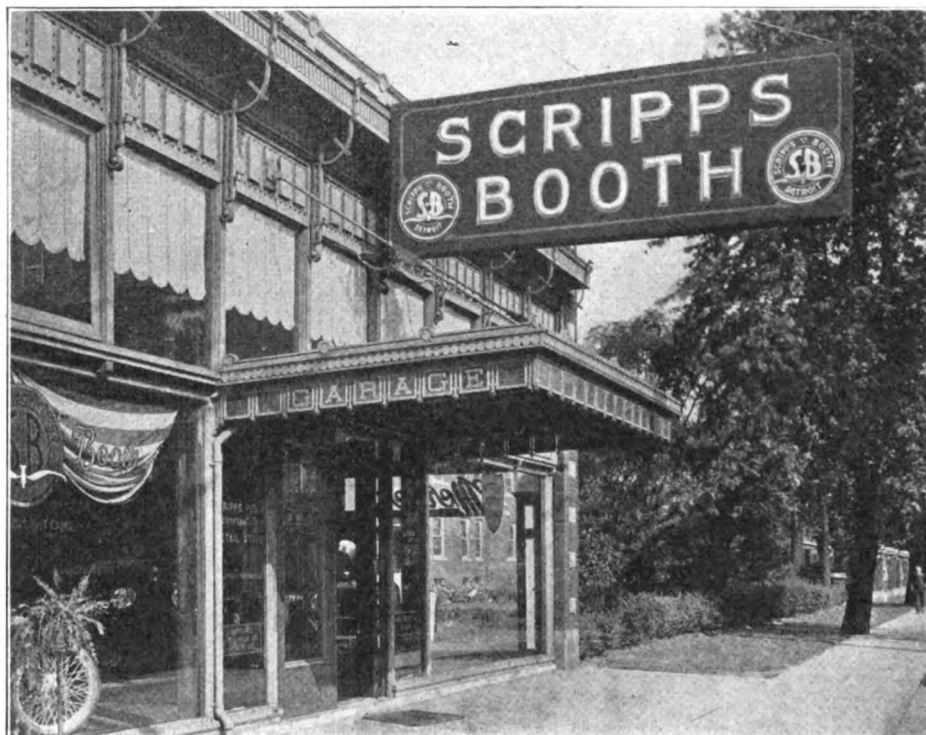
Our movie manager was wrong in his suggestion of a blaze of electrical brilliancy with spotlights from across the street as the best means of attracting attention to an automobile salesroom. For the moving picture theater this is good medicine, but the motor car sales agency presents different problems, particularly where cars of the better class are sold. There the thing wanted is not only to attract attention but at the same time to suggest the idea of quality and refinement.

This cannot be done if the electrical display is so shrieking that it competes with a Coney Island resort. The plan which has been found best is to first so design the electrical display that it is artistic and striking, and then make it bright simply by using lots of

"juice." It is not the size of the display which counts so much as the brightness of each character, and this is best obtained by the use of high-powered lamps.

In planning his sign, one thing the automobile dealer should not overlook is the possibility of "tying-up" his location with the national advertising of the car he handles. At first thought he may ask: "Why should I feature the maker's name in my sign? It is my business that I want to advertise."

The answer is that by using the maker's name, you will get more out of it than he will. His trademark has been made world-known by costly ad-



Distinctive Sign Which Draws Attention to One of Detroit's 'Classy' Showrooms.

Not much! I went across the street and arranged to have a spotlight thrown on the whole theater front.

"Now, you may say that was unnecessary expense, but I tell you it wasn't. If you want to get business, you must make your place stand out just like we do. The only thing you can't afford is to be unknown."

All this is just a theater manager's idea of running an automobile business, but nevertheless there is a glimmer of truth in it. Just so long as human beings continue to be attracted by light, the proper kind of electrical display will be profitable to any business. The trick is in knowing what

vertising. Many people have been "sold" on the car through the advertising, but they do not know where it can be bought. If you have a bright attractive electric sign above your door reproducing this trademark, there is little chance of this happening. The passerby sees the trademark in illuminated letters and associates your location with all that he has read about the car. It is simply a case of cashing in on the manufacturer's advertising.

Now to get down to the details of sign selection:

The selection of the style of sign which is best for a particular building depends upon a number of things, such as the position of the building with reference to main thoroughfares, the architecture, the kind of car to be sold, and last but not least, the particular city ordinances regarding signs.

Some cities have gone to extremes in the matter of regulating electric signs. For instance, there are certain cities where no sign is allowed to project over the sidewalk more than five feet. In other cities, the type of sign is regulated by law. Fortunately, in the great majority of important cities, the ordinances regulating electric signs are quite liberal.

Before deciding upon the style of sign to be used, it would be well to look into the ordinances of your own particular city and make sure that you are not due to run up against some legal stumbling block.

Granted that the local ordinances will permit the erection of any of the ordinary styles of signs, the main thing to be considered is effectiveness. As a general rule, a sign projecting from the store front will attract more attention than a sign flush with the front of the building. One reason for this is that where the sign projects, it is customary to



Popular Types of Projecting Electric Signs.

use what is generally spoken of as a "double-faced" sign—in other words, a sign having letters on both sides. This makes the sign readable, no matter from which direction one approaches it.

In many cases, the garage or showroom is not on the principal thoroughfare. It may be located on a street running at right angles to a main highway, and often between two streets that are much traveled. In cases of this kind, the projecting sign is much

to be preferred, for with proper illumination, it is seen from the more traveled streets, thus giving the business almost the same advantage as if it were on the more important thoroughfare.

It should not be implied, however, that projecting signs are always best for showroom or garage. As a matter of fact, some of the most beautiful electrical advertising effects have been produced by means of single-faced signs across the front of the building and flush with it. It is usual, however, where this type of sign is used, to make it larger and with greater electrical effect than in the case of the projecting sign.

Electric signs can be divided into three general classifications.

The oldest kind is the exposed lamp sign in which the letters are formed of individual electric bulbs. This type is unsurpassed for some purposes, particularly roof signs. It is largely used in projecting signs and electrical displays intended to be seen at a distance.

Another type of sign is that known as the flat glass transparency in which the lamps are inclosed within the body of the sign, the letters being cut out of the face and fitted with glass. While this type often shows up better in the day time than a sign composed of exposed lamps, and some pleasing effects have been obtained, it has no particular advantages over the other

two types except that it is often produced at lower cost.

In the third class of electric signs for outside display the letters are formed of raised snow-white glass. The lamps are so arranged that all of the light is thrown through the openings which form the letters. As the face of the sign is darker than the snow-white letters, the day appearance is decidedly striking—raised white letters on a dark background. The



Excellent Example of Projecting Sign of Exposed Lamp Type.

night effect is solid letters of light standing out of the darkness, each one clean cut and distinct. Any trademark can be perfectly reproduced in the raised characters used in this type of sign.

One of the first questions asked by one who is considering the advisability of using electrical advertising is: "How much will the sign cost for current?"

You see a large sign flashing forth brilliancy, and the natural conclusion of one who has not looked carefully into the matter is that the cost for current must be enormous. As a matter of fact, it is surprisingly small.

There are so many factors entering into the cost of current that it is impossible to give any fixed rules that will apply to all cases and all localities. One of the leading sign companies estimates its current cost at one cent per letter per night. This estimate is, of course, too general to be of any practical use, but it shows graphically the small amount of money involved for maintaining electric signs.

In what is known as the exposed lamp type of sign, the number of lamps varies so that it is difficult to make a clear estimate of the cost of "juice." Take, for illustration of illuminating cost, a double-faced sign of the type with the raised white glass

letters. Suppose this sign spells out the word "Garage". That means six letters or twelve lamps—say for easy figuring, that they are 50-watt lamps. This means 600 watts or 6/10 kilowatt per hour.

At a cost of ten cents per kilowatt, this would amount to six cents per hour. The rate, of course, varies in different localities, but ten cents would be a high rate; also, the wattage of the lamps used varies and this would, of course, have an effect on the cost of current.

One thing is sure, an electric sign of considerable size and of all necessary brilliancy can be maintained at a cost of a few cents per night.

Electrical advertising is an art in itself. The best way to get satisfactory results is to decide in a general way the effect you want to produce and then put your problem up to some sign manufacturer and let him show you a sketch which will give you a concrete idea of what your sign is going to look like.

ACCOUNTING SYSTEMS FOR GARAGES.

(Concluded from page 17)

inventory which would take cash to replace. As these balances will all be written off to expense in the course of business, they are not considered

current or tangible assets in the ordinary use of the term.

Good Will, Contracts, Patents, Patterns, Treasury Stock: These are some of the other assets that might be considered, but as they are not found among the accounts of the average garage owner, we will take them up only by special request.

(To be continued)

Quiz Questions on Garage Accounting.

1. Where cash, bank, and petty cash accounts are carried, itemize the debits and credits to each.
2. What are cash assets?
3. Which accounts in the assets division are classified as "receivables"?
4. How would you set up an allowance for doubtful accounts?
5. What is meant by the term "suspense"?
6. Why are Liberty bonds, postage, War Savings and revenue stamps carried as cash assets?
7. Define "Notes Receivable Discounted."
8. How would you set up an "allowance for doubtful notes receivable"?
9. Itemize the account merchandise; shop equipment; office equipment; salesroom equipment; deferred charges; supplies.
10. Define "sundry debtors."
11. Give a general rule for setting up depreciation on your books.

The Profitable Use of Window Space

How Some Progressive Dealers in Various Parts of the Country Have Dressed Their Windows to Attract Attention to Their Specialties—Ideas of Displaying Tires Which May Be Adapted to Suit Particular Conditions

That effective display windows are good advertising and attract customers can scarcely be questioned. The following descriptions of several unique displays have been obtained from different sections of the country, and are given with the thought that the ideas presented may prove of interest to our readers.

The Silhouette Setting.

The National Rubber Co., Atlantic City, N. J., covered the entire rear wall of its show window with a grey curtain effect executed in cardboard. On the cardboard were pasted silhouettes cut from black paper. The silhouette subjects consisted of automobiles, automobiles, and motorists, with pieces of scenery such as trees, fences and fields, "planted" there for "atmosphere." A few of the car owners were running along without incident, while the others were tinkering with their machines,

fixing tire troubles, or adjusting spoke wheels.

A large automobile truck wheel occupied the center of the display, with an easel, on which a spoke wheel revolved slowly, at each side of the truck tire. The spoke wheel was kept in motion by a mechanical device.

Down in front were miniature tires, each not more than six inches in circumference. The miniature tires were bunched in twos at equal distances apart. Inner tubes rested on the floor along by the window glass.

The Palmy Bower.

G. Marquette, Chicago, is fortunate enough to have permanent window decorations that are appropriate for tire displays. Pillars support the window and rise to the ceiling. At the time the display about to be described was arranged, the sides of the pillars were covered with wood fibre,

while the tops of the pillars were cleverly camouflaged in a bunch of artificial palm leaves.

At the base of each pillar a green bucket piece of woodwork was placed, giving the effect of a hot-house palm. The middle of the window was given over to some attractive mission type wooden pedestals, on which huge ferns were placed. Laid over a mass of freshly-pressed and brightly-colored autumn leaves down in front, were several automobile tires.

A Neat Arrangement of Tires.

The Bridgeport Tire Co., Bridgeport, Conn., placed a tall rubber plant at each rear side of its window. In front of each rubber plant was an automobile tire in an upright position, with an inner tube folded over the top of the tire. In the middle came an upright tire, the broadside facing the street.

The other tires were grouped with it, diagonally to the front. A tube was draped across the two front tires, while a strip of green plush was laid on the floor between and across the rim of the inside two front tires.

At each side of the middle group was a tube in its container, with a red rubber tube resting on the floor in front. The floor was covered with red crepe paper.

How the Rosette Helped.

H. H. Thompson, Newark, N. J., gave his tire window a dressy appearance. The

papers, they prepared the window display shown in the illustration, featuring tires and parts for the Ford cars.

The advertisement was illustrated with a cut of this window display, and a list of reduced prices for parts and service work given, thus tying up their window display with their advertising.

Owing to the utilization of machine work, which they consider more precise as well as more rapid than hand work, a very substantial reduction in labor operation prices has been made. Every job is guaranteed

other consideration was that the machinery, manufactured product and processes in the 10-hour plant should be sufficiently similar to the eight-hour plant to make a fair comparison.

The main conclusions are:

Maintenance of output: The outstanding feature of the eight-hour day is steady maintenance of output. The outstanding feature of the 10-hour system is the decline of output.

Lost time: Under the eight-hour system, work with almost full power begins



Window Display—A Photograph of Which Was Featured in the Firm's Local Newspaper Advertising.

tires were exhibited on individual clasps, with a blue crepe paper rosette artistically arranged around the rim of each tire.

How Crude Rubber Is Gotten.

The National Rubber Supply Co., Denver, Colo., arranged a tire exhibit that caught the eye of every passer-by. Occupying the center front was a large skin made into a bag with thongs of leather. The placard placed by the exhibit explained that the—

"Natives of Africa carry the crude rubber long distances in bags like this."

Stacks of crude rubber were piled at each front side, while tires were displayed at the rear of the window.

Window Displays and Advertising.

A short time ago Snow Bros., of Oak Park, Ill., a suburb of Chicago, announced that, in keeping with the general trend of downward prices, a cut in their labor operation prices in replacing parts for Ford cars, and repair service, was being made.

Just previous to the publishing of a full page advertisement in the local weekly

and none but genuine Ford parts are used for replacements.

Snow Bros. do not believe in the idea that "business is poor." "Business was never better," they say. "Why last month one of our salesmen sold 24 Ford cars, an average of one car for each working day of the month. Business is good!"

Finds Eight-Hour Day Produces Plant Efficiency.

The eight-hour day is not only more efficient than the ten-hour day in industrial plants, but is more economical.

This is the conclusion reached by experts of the United States Public Health Service after a careful detailed study of conditions and production in standard factory of both classes, which has been under way since 1917.

The plants surveyed were selected after a great deal of care. Each is a modern factory, employing such a large number of workers as to make any conclusions reached apply to industry in general. The

and ends approximately on schedule, and lost time is reduced to a minimum. Under the 10-hour system, work ceases regularly before the end of the spell and lost time is frequent.

Stereotyped output: Under the 10-hour system the laborers seem to artificially restrict their efforts and to keep pace with the less efficient workers. Under the eight-hour day the output varies more nearly according to the individual capacity of the laborer; that is, each is more likely to do his utmost, rather than an "average day's work," regulated by a low standard.

Industrial accidents: This phase of the study is of particular interest. Ordinarily accidents may be expected to vary directly with speed of production, owing to increased exposure to risk. But when fatigue is taken into consideration, there is a marked modification of this rule. When there is a reduction of output due to fatigue there is a rise in the number of accidents; that is, in the last hours of the 10 or 12-hour day, in spite of employees slowing up in work, more accidents occur.

Welding, Cutting and Brazing Practice

Some Specific Examples of Sheet Metal Welding Described—Method for Handling Each Job—Most of the Devices Employed in Ripple Welding Are Utilized in the Other Forms of Welding—Other Lines of Sheet Metal Work

By David Baxter

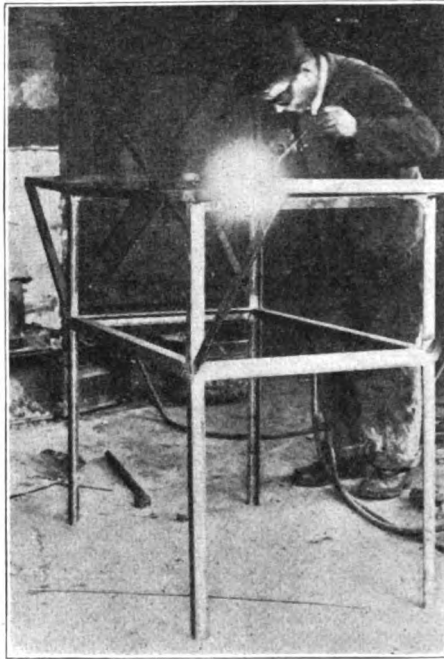
Last month we discussed some of the fundamentals and generalities of the welding of sheet metal in relation to its place in garage work. This month let us delve more into the specific. Let us take examples of what may be done along this line and see just how each job is handled. Take first the example of straight welding—where two flat plates of sheet iron are welded together. The edges to be welded are examined and cleaned of all rust or other foreign matter. This is to prevent their becoming entangled with the melting weld to cause any deflection of the onward march of the oxy-acetylene flame.

If the sheets are new, only a superficial cleaning is needed, but if old and pitted with rust, they should be thoroughly brushed with a steel wire brush or scraped with a file. By passing the welding flame along the edges of the sheets, the rust is made easier to remove.

Next the sheets are arranged side by side upon the welding table, with a sheet of asbestos paper beneath them to help prevent the heat of the weld from being conducted from the weld to the colder portions of the sheets, and to protect the table top. Then after measuring the length of the sheets to determine the amount to separate them, the sheets are arranged so one end of each almost touches the other, say within an eighth of an inch, while at the opposite end they are a quarter of an

other words, they will meet exactly. If not correctly welded they will overlap or be warped.

After being certain that the sheets are spread at the same angle, the job is ready



Building Skeleton of Metal Washrack, Practically Same As Sheet-Metal Welding.

to weld. The torch is fitted with the proper size tip, and the thickness of the sheets are measured to get an estimate of the proper filler rod diameter. Then the flame is lighted, adjusted neutral, and applied to the closed end of the sheets. Here it is revolved over or moved in arcs across the two sheets, close to their corners.

As the metal changes color, the space covered by the flame is decreased until only about a quarter of an inch is starting to melt. The action of the flame is then confined to the very edges of the sheets. These edges are melted and blown down with the force of the flame until they flow together.

During this operation the filler rod is brought close to the flame, so it can start to heat and be ready to melt when the edges of the sheets are flowed together. When this is a fact, the molten end of the rod is placed in contact with the weld. Then the flame plays upon both the rod end and the sheet metal alternately or at the same time, according to their condition.

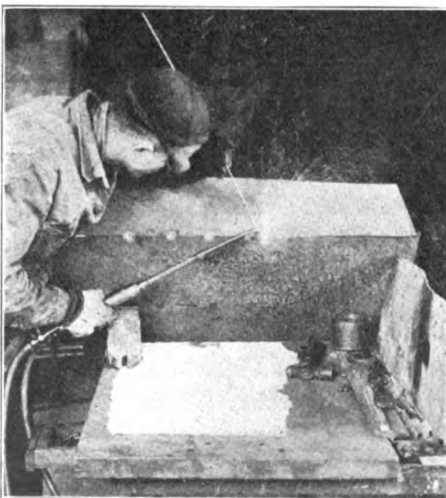
As the melting of the sheet metal increases, the end of the filler rod melts and settles into it. When this occurs the rod

is given a gentle forward push in the direction of the starting point, and almost with the same motion, the rod is gently drawn back again. By this combination of movements, in conjunction with a deft application of the flame pressure, a ripple is deposited in a tiny curve across the weld near the start of it. The rod is then moved back and forth in the same manner to deposit another ripple close to the first, and so on the full length of the seam.

The rod is always kept in contact with the melting weld, and the flame always prepares the way for the filler by melting down the corners of the sheets and flowing them together simultaneously with the melting rod. The result of this procedure is what is termed a ripple weld. A series of symmetrical ripples is deposited along the seam that is pleasing enough to the eye to need no filling or otherwise finishing.

While the ripples are being deposited, the separate ends of the sheets are gradually drawing together. If their spread has been correctly estimated and the welding has been properly executed without interruption, the ends of the sheets will meet quite accurately, for, as the melted metal cools behind the torch, it contracts and pulls inward upon both sheets. Then, after the first few inches of the weld are fully contracted and hold the sheets rigid, the rest of the weld contracts and closes the space between the sheets very much as a pair of shears operates.

In an endeavor to understand this seeming phenomena, the welder should remember that the melted filler metal and the



The Position of the Torch and Filler Rod in Ripple Welding.

inch apart for every foot of their length. The sheets being five foot long the spread would be an inch and a quarter.

If the welding is properly executed, they will be exactly parallel when welded. In

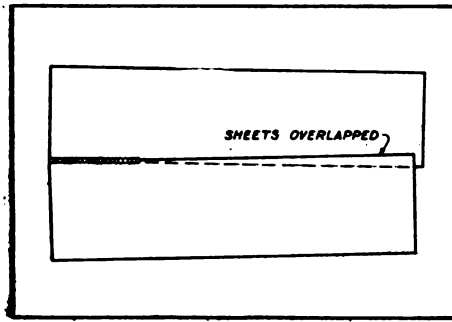


Sheets Overlapping—Result of Not Spreading Them Apart Before Welding.

portions of the sheets that are melted must occupy a smaller space when cold and fully contracted than when melted and fully expanded. Being connected to both sheets, the shrinkage will naturally draw them in-

wards. It is obvious, then, the less metal that is expanded the less will be the pull of contraction. Therefore, the weld should be confined to as narrow a strip as possible.

It should also be quite plain that, if the



Spreading Sheets to Prevent Overlapping.

operator is slow or pauses during the welding, the contraction will act closer to the point where the flame is being applied and will, therefore, cause the sheets to draw together faster, with the result that they may overlap in spite of the spread, unless this has been very wide in the beginning.

In other words, the contraction will catch up with the weld, literally speaking, and cause the sheets to come together ahead of the flame, so that by the time the seam is little more than half finished, one sheet will be crawling on top of the other. This not only prohibits further welding, but it pulls the sheets out of shape.

On the other hand, if the welder is a rapid workman he may get so far in advance of the contraction that the sheets will not be drawn together rapidly enough, which increases the width of the weld so much that, when it finally cools, the contraction will cause the seam to be in waves. The rapid welder should decrease the amount of spread in proportion to his ability.

Both the naturally slow and the extra rapid welder should watch the contraction and endeavor to keep pace with it. They should judge their work so the sheets will be close together all the time at the point where the flame is being applied. If the seam is not closing fast enough, the flame is withdrawn a few moments to permit the contraction to catch up. If the spread is closing too fast, the flame is played back over a few inches of the welded portion of the seam in order to bring up the expansion and, therefore, stop the spread from closing until a few inches of the seam can be welded. In a word, the welder often has to suit his operations to the action of the weld regardless of his ability.

To make the weld just described without the ripple effect, the rod is held in a more perpendicular position, as is also the flame. The flame is swung in short arcs across the seam, or it may be revolved in circles that barely include the edges of the sheets. While this is being done, the end of the filler rod is introduced so that when the spot starts to melt, the filler will also.

The melting filler is brought into contact with the melting weld, where it is given a twisting motion calculated to mix the two metals. A small pool is thus formed which is gradually lengthened as the work moves along the seam. The filler is literally pushed into the molten weld as the rod melts. In this, too, the weld is confined to as narrow a strip as possible in order to better control contraction, for in this method the sheets are drawn together the same as in ripple welding.

The filler metal is melted smooth along the seam with only a slight surplus piled along the weld; in fact, only enough filler is added to mix and join the edges of the sheets. The power of the flame is used more, perhaps, than the rod; the metal is floated about with the flame pressure. Most of the devices employed in ripple welding for regulating the spread of the sheets are utilized in the other forms.

When welding in a circle such as the heads or ends of gasoline tanks, the same principle is involved. The operator may disregard expansion, since only the filler metal and the edges of the sheets are expanded. One way to overcome contraction is to cut the tank head a little smaller than the barrel and wedge it in place with nails or other bits of metals so that it touches one side and leaves an opening around the head, which is the widest at a point opposite where the head touches the barrel.

This is estimated about the same as for straight sheet welding from an eighth to a quarter of an inch per foot. Only half of the circumference is measured, however, as the weld is to be made in two sections, and then only when the head is to be set inside of the barrel.

If the circumference is three feet, the widest part of the spread is approximately three-eighths of an inch. The head is wedged in place, either flush with the end of the tank or is inserted a trifle; the latter probably makes a stronger joint. Then the flame and filler are applied at a point in the center of the portion where the head touches the side of the tank. Then the weld is made in the same manner as previously described.

The weld is made about one-fourth of the distance around the circle; then the flame is moved back to the starting point. Here the weld is made about one-fourth of the other side of the circle. From here, the torch is swung over to the first weld, where the flame is again applied and the other portion of this side is welded.

Once more the torch is shifted to finish the second half of the circle. In this the welder must watch the contraction and govern his work accordingly. He may be forced to shift quickly from one weld to the other in order to keep the expansion neutralized. After the first head is in place; the other one is not so difficult to control.

If the heads are inset, the metal of the barrel that projects beyond the end should

be melted down with filler to form a neat corner and a stronger joint, unless the tank is made of heavy metal, in which event a fillet of metal is added around the tank inside of the head. Either the ripple or the plastic weld may be employed on tank work. Whichever is employed, the head ought to be dished outward somewhat as this provides play for contraction.

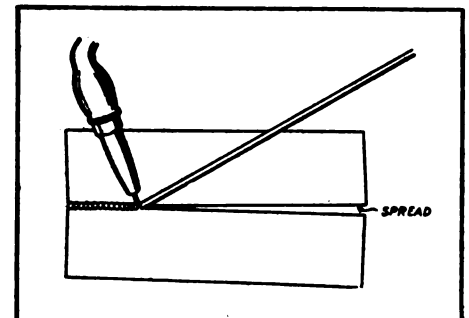
To make the tank body, the sheet is first cut to exact size and rolled so its edges meet. Then one end is spread in the same manner as for straight welding. This may be done with wedges or clamps, or with any special arrangement of rings. The clamps are usually left in place until the welding is well underway, after which some sort of wedging device is employed to hold the sheets apart. The welding is started at the closed end and proceeds about as has already been described.

Another method used in welding sheet iron tanks to prevent distortion is to flatten the tank a little in such a way that contraction will pull it straight, which is, in effect, the same as welding two flat sheets.

Still another method of inserting the heads is to cut them a trifle larger than the ends of the tank. Then dish the heads enough that they will fit loosely in the barrel. This dishing provides play so the contraction will tend to pull the head straight and reduce the distortion. The heads may also be flanged and inserted with the flange outward; in which event the welder merely welds the flanged edge of the head and the edge of the body metal into one mass by working entirely around the circle.

Straight seams in square tanks are usually made by first spot-welding them and then welding back from one spot to another—that is, by starting at No. 2 and welding back to No. 1. Then starting at No. 3 and welding back to No. 2, and so on. This is clearly indicated in one of the illustrations.

The most of the tank work in garages will be on small tanks, which are not so difficult, due to the shorter stretches of welding and due to the light metal used in their construction. There is one thing



Spot-welding Method Employed on Square Corners.

in connection with thin metal, however, that may be well to emphasize. It is the great danger of burning holes through the sheet, for, if the welder is not very careful, he will burn through just about the time

(Concluded on page 30)

Do You Make 'Em or Get 'Em? Taps

It Pays to Get 'Em but It Doesn't Always Pay to Make Them—Elmer Dwain's Father Was a Tool Maker and Made Many Tools for Use in Elmer's Garage—Then Elmer Learned Something About Taps and Dies

By J. N. Bagley

Elmer Dwain is considered one of the best all-around mechanics in the section of the country where he lives, having worked with tools all his life under the supervision of his father, Slayter, who learned the trade in the old country and came over here when a young man.

The elder Dwain for many years owned and operated a small general repair shop, repairing all sorts of small machines, guns, etc. Later when automobiles came into general use, Elmer was quick to see great possibilities in the new field of automobile repairing. The matter of opening a repair shop or garage was discussed from time to time, but Dwain, senior, was hard to move, for he contended that automobiles were not practical and would not last many years.

Elmer kept the subject continually before his father until he finally, to get a little peace, consented to finance the project to the extent of \$4,500 for a building. His argument for putting up a large building was that Elmer would see his mistake in a short time and, having a nice, large building, could use it for an implement house.

He designed the building with but one thought in his mind—that it would be used for machinery sooner or later. In one corner he placed a partition, setting off a space about 16 ft. by 20 ft. for his own little private shop where he could continue his work, as in times past, repairing small machinery, guns, etc.

Elmer started with a small bench and a handful of tools, mostly made by his father. There were not many cars then, so work came in very slowly and Dwain, senior, would remark nearly every day, and sometimes twice a day:

"Didn't I tell you, Elmer, them things wouldn't ever come into general use? We might just as well rent the building to

Brome Bros. for their implement business. It will make them a right smart of a place, right here on Main Street and, besides, the rent would be a great help to us right now while business is a little slack."

Again Elmer protested and the matter was dropped, and Mr. Dwain turned to a customer who came in to have a new hammer fitted to a shotgun.

A year passed and Elmer was getting quite a little to do and had taken the agency for a five-passenger, two-cylinder, touring car. The first two months he succeeded in selling six of them to farmers and one to the Brome Bros. Elmer's bank account began to grow and his father began to sit up and take notice. Occasionally he would

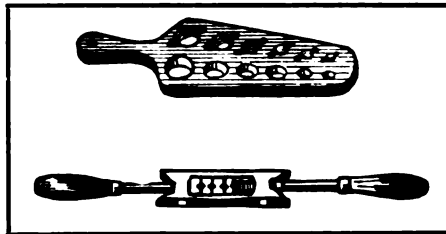


Fig. 2.—Styles of Home-made Dies.

hint to Elmer that he needed a partner in the business.

Fall came and Elmer had to his credit 28 sales of five-passenger, two-cylinder cars, and a very handsome bank account to take him through the winter. Repair work began to come in and Elmer saw the necessity of having a good tool equipment. He was placing his order when his father came along and listened for a few minutes with-

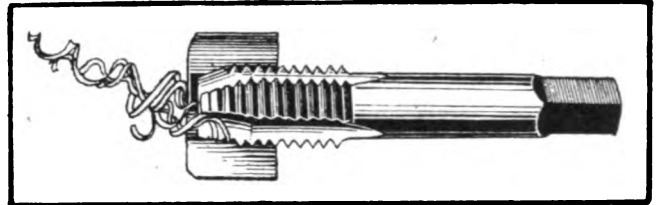


Fig. 3.—Peculiar-Shaped Tap Which Works Well in Tougher Metals—Cuttings Shoot Out Ahead of Tap.

out saying anything. Then he broke out in a new place with: "Elmer, don't you know that I can make all the tools you need, and save you a lot of money, for I ain't very busy just now."

"That's right, Dad, you are a tool maker, but you know Swails is bringing in a couple of guns Saturday and you won't have the time."

"Now, listen, Elmer, you've ordered hammers, wrenches, drills, etc.—and I kin make every durned one of them."

"How about taps and dies?" inquired the salesman.

"Yes, and I kin make 'em too. I tell you, Elmer, you just give this drummer an order for some steel, and I'll make them taps and dies. They cost like fun, if you buy 'em, and I kin make 'em just about as good."

Elmer couldn't convince his father that he should buy his taps and dies, so he ordered the steel. The steel came and the taps and dies were made, in a way. The first one to be used was on a steering gear rod on the car belonging to Brome Bros. Elmer worked and sweated to get the die to start and gave it up in disgust. His father came in just in time to see it go slam into a corner.

"By the Pipers of Mutton Turf! I'll make you some more tools."

"If you had let me order the set I wanted, I would have had it now. As it is, this job must set here in the shop until I get it."

"Bosh!" returned his father, "I kin make that die work." And with that he dug the die out of the corner and went to work. After rounding the end of the shaft with a file he finally succeeded in getting a very shallow thread.

The job was finished and Joe Brome drove the car out of the shop and started south along Widow Sells' picket fence which enclosed her house. The nut came off and the car went this way and that; Joe became too excited to stop it, and over the top of Widow Sells' fence went Joe, car and all. It finally stopped when it rammed into the side of the smokehouse that sat on the rear of the lot.

All this time Elmer stood in the door-

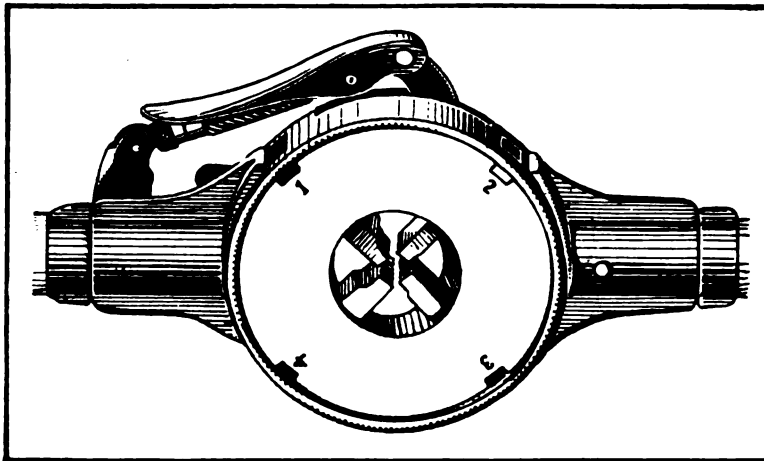


Fig. 1.—Quick-Opening Die Stock Which Is a Time-Saver.

way of the garage watching the procedure. "Gosh! Elmer, that fellow can't drive 'em, can he?"

"Drive nothing, Dad, that nut you put on is off. Couldn't anyone drive it?"

"Eh!" returned his father, peering over the top of his cracked glasses.

"Next time, you will listen to me; you can't make taps and dies, Dad, for repairing automobiles. You want to get that notion out of your head."

"If he'd steered it without jerkin', it would have been all right." And back into the shop went Mr. Dwain.

After the car was righted up, gotten back into the shop and the fence fixed up, to say nothing of flower beds, etc., that couldn't be fixed, Elmer was out about \$45. The dies to repair the car were ordered by wire to expedite matters.

Elmer says, "Get 'em, but for goodness sake, don't make 'em!"

Elmer has a hobby—it is good tools.

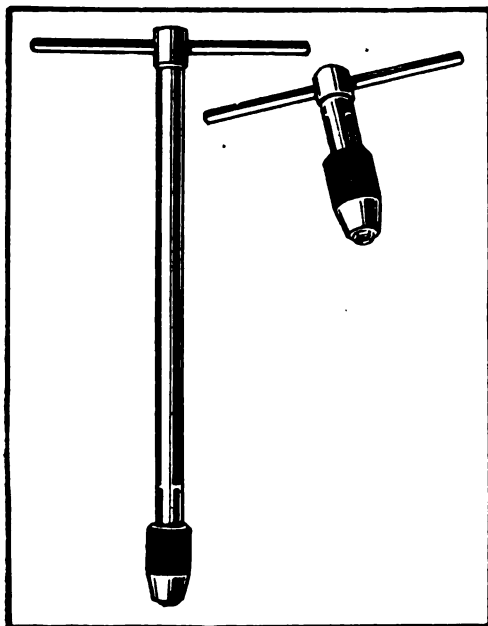


Fig. 4.—Types of Adjustable Tap Wrenches.

He usually buys from every salesman that comes along with a tool that will help cut repair expenses for his customer. Only a few days ago Elmer was placing an order for a new style, quick-opening die and his father was looking over his shoulder.

Elmer noticed him and remarked to the salesman that he guessed he would scratch it off as "Dad is a regular diemaker." Elmer laughed and his father took a peek over the top of his specks at the salesman and left the scene, for he knew right then that Elmer was going to tell the salesman about the time they made dies one day and how the yard fence was fixed the next day.

Elmer is one of these fellows who believes in keeping abreast of the times. The quicker he can do a piece of work, and the less expense he can make his customer, the better he likes it.

His tap and die equipment is very complete, yet he is selling his old style taps and

dies to his former customers and replacing them with a type such as shown in Fig. 1. Upon being asked the reason for this, he replied:

"With the solid die it takes just about as long to take the die off the work as it does to cut the threads. With this quick-opening die, the minute the thread is cut the desired length, the lever can be turned back and the die lifted off. This saves just one-half the time, and the die will last just twice as long as the type I am getting rid of."

"I am a busy man, and the tool that enables me to do two jobs in the same length of time I used to do one, is the tool I want in my shop equipment."

Every hoist he uses is the fastest he can buy. The jack that will lift the car and let it down in the least possible time is the type you will find about Elmer's place.

Elmer does not do a great deal of repairing himself, but he oversees and shoots trouble for the other boys. He always carries in his car pockets a bunch of small tools that he uses many times every day: A screw-driver set consisting of three or four drivers, one telescoping the other and each a different size; a couple of adjustable wrenches that can be adjusted to many sizes of nuts; a half-dozen sizes of rethreading dies for starting stubborn nuts. These dies take up no more room than the nut and often save a great deal of time in starting nuts onto jammed threads.

Mr. Dwain, senior, to this day still declares that his tap and die assortment is just about as good as Elmer's, and didn't cost nearly as much, but it is interesting to look over his hand-made tools. There was a time when they were as good as any on hand, but if he were to figure the time it cost him to make them, they have cost him over twice what the same tools would cost today from the manufacturer.

The latest addition to Elmer's tap and die equipment is in marked contrast to two selected from old Mr. Dwain's equipment and shown in Fig. 2. I might mention just now that the die shown in the upper part of Fig. 2 is of the same style and type that threaded the steering gearshaft on the car that wrecked Mrs. Sell's fence and smokehouse. Mr. Dwain takes quite a little pride in showing the various tools he has made, but every time he starts to show them, Elmer always gets in with: "Say, Dad, show 'em that die that fixed Mrs. Sell's smokehouse."

Elmer has just added to his large stock of taps quite a number of sizes, one of which is shown in Fig. 3. This tap is of a peculiar shape and works well in some of the tougher metals. The cuttings shoot out ahead of the tap as it goes through the metal. This tap is of more rugged construction than any I have ever seen, and Elmer tells me that he has never had one break due to the cuttings

winding into the flutes as is quite often the case with the ordinary taps—be it monel metal or vanadium steel, it makes no difference.

Only a few days ago, the writer noticed a mechanic using an ordinary 8-inch monkey wrench to drive a ¼-inch machine screw

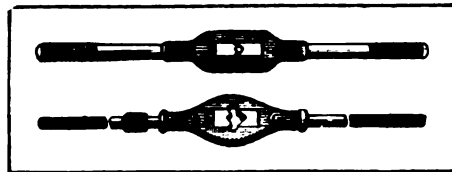


Fig. 5.—Adjustable Wrenches for Larger-Sized Taps.

tap. He ruined the tap for it was broken just above the thread. He then spent at least one hour in removing the broken half from the hole, besides scarring up a nice polished surface.

How much better it would have been had he used a little tool, something like the one shown in Fig. 4. These tap wrenches are invaluable for driving small taps and can be had in many different sizes and lengths. They are fitted with small chucks, making the adjustment to the different sizes of tap shanks. The little wrenches list at from 50 cents to \$1 and will be worth many times their cost during the year, being made of steel, carefully hardened and tempered.

In Fig. 5 is shown a couple of the plain adjustable tap wrenches used for driving the larger sized taps. This tap wrench has advantages over ordinary wrenches in driving taps home. In the first place, the pressure is evenly distributed and the tap can be started straight. In the second place, the tap is gripped tight enough without effort to prevent the corner being chipped off the square. With the common wrench, the shank is gripped on two sides only and it is next to impossible to start a tap straight.

Another valuable die to add to the garage equipment is the type shown in Fig. 6. The ratchet die stock is invaluable for tapping under the car where the ordinary tap and die stock cannot be handled. This is especially valuable for using in repairing broken frames, radiators, supports, etc.

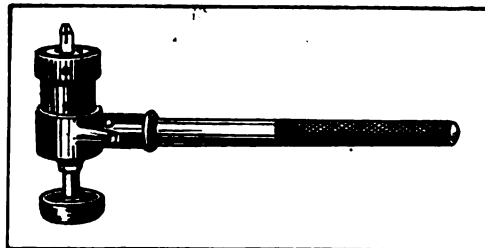


Fig. 6.—The Ratchet Die Stock.

The writer picked up a table of tap drill sizes in a hardware store a few days ago that is invaluable to the garageman. The chart is printed on heavy board of a convenient size for pocket use or can be hung up near the bench, as provision is made

for hanging. Tap and drill sizes are given for both U. S. F. and S. A. E. threads as well as A. S. M. E. Standard. The address of the manufacturer issuing it may be obtained from the editor of the AMERICAN GARAGE & AUTO DEALER.

Drills used as per the chart will give 75 per cent depth of thread. A full depth of thread in a common nut is only 5 per cent stronger than a 75 per cent depth thread, yet it requires three times the power to tap, and the risk of breaking is many times greater.

A common nut, drilled out so that it contains only 50 per cent of a full thread will, in nearly every instance, break the bolt be-

fore it will strip. Therefore, there is no advantage in cutting a thread more than 75 per cent of the depth of itself as it yields an ample margin of safety—two to one—and economy is the big item.

The chart mentioned is invaluable, for it gives in decimals the ideal hole to drill to produce 75 per cent depth of thread, tapping with a given tap. The drill size indicated is the nearest commercial size to produce the desired result.

Not long ago the writer happened to be in a garage when the mechanic was repairing a car. In replacing the cylinder head, one of the capscrews was drawn down sufficiently tight to strip the threads from the

casting. The mechanic at once set about to drill the hole out and use the next size larger tap. After spending some ten or fifteen minutes measuring, he selected a drill for the job, but when the hole was drilled, he found it so large that the tap almost fell into it.

Had this mechanic had before him the chart mentioned, giving the proper size drill for the tap he wished, all the trouble and worry would have been done away with. The customer would have received a first-class job in short time and the garageman could have saved some of the language he used so promiscuously, that didn't help matters in the least.

Glimpses in the Garageman's World

Ideas Used by Garagemen for "Making Their Places Stand Out from the Rest—Publicity of Some Kind Is Used in Connection with Courtesy and Service—Sign, Business Card and Postal Card Ideas Utilized

To many men, going into the garage business is merely going into the garage business and letting one's identity and personality sink into the average or the commonplace. Others are clever enough to do the things which make their places of business stand out from "the pack" and thus get their business with less effort.

A. L. Neis, whose repair shop is the successor to an exclusive blacksmith shop on Pasadena Avenue, Highland Park, Calif., a street of heavy traffic, has retained the name "Village Blacksmith" for his shop and that name, painted in large white letters on his building, has caused hundreds to note and to remember that "down the highway away there is a repair shop. I remember seeing it—"Village Blacksmith," he calls the place."

As he sells service to patrons, another garageman gives them his card; and he has every reason to feel that this card is kept—right where it will come in handy.

Instead of the usual style of card, he prints on the reverse side of his card some blanks that will be of help to the owner of the car. The heads of the blanks are shown on this page.

The card is just the right size to fit into one of the slots or pockets of the patron's pocketbook; and it enables him to have handy information that might be elsewhere when wanted most.

Helped Cop and Got Advertising.

Knowing that there is no comfort in standing in the middle of a wet street all



He Makes His Place Stand Out From Others—"The Village Blacksmith."

day, a garageman had made up for four of the local police officers who are on traffic duty, a little platform that is about 25 ins.

Telephone Numbers.

.....
License No.
Engine No.
Tire No.
Tire No.
Tire No.
Tire No.
Tire No.
Tire No.

Insurance Policies' Dates.

.....
.....

One Side of a Garageman's Card.

by 24 ins. and four ins. high. It is a heavy wooden frame with a zinc top.

The officer uses this in the hours he is on duty to keep up above the wet and to get a better view of the traffic. Before go-

ing on "off duty"—that is all day on Sunday—he grasps the platform by the handle on the side and carries it to a corner. Then, on the under side, is visible the garageman's advertisement, as the platform rests, top in, against the corner of a building.

The platform pleases the officer, helps him in his work and gains publicity for the garage.

Spice to Shop Window.

The foreman of a certain garage is a man who easily makes friends. When he went away for his vacation into Colorado, the proprietor kept the

many persons who were bound to inquire for him, in touch with him. He arranged for a series of message to come daily from the foreman.

Thus each morning there would appear in the window of the shop some humorous message in regard to the experiences of this man. In the two weeks, about 12 photographs were also posted. It brought many men to the window and amused them. Some of the messages ran:

Got stuck fording the Scioto near Meadows. But with my _____ and a team of mules and some swearing we made it. (Don't let any of the boys start touring without a _____. It's a lifesaver.)

Show this picture to Merritt Neal—he claims to be a real fisherman. All caught before 10 o'clock—and eaten before 1.

Leaving Apache this forenoon. Hope to make Wells Point by sundown. Will soon see the boys.

Trouble-Shooting Air Compressors

Some Helpful Suggestions for Locating Trouble in Air Compressor Units—
Specific Difficulties Described and Remedies Prescribed—General Direc-
tions for Procedure and a Few Hints for Proper Care of Compressors

By C. A. Dickerson

The locating of trouble in air compressors may be divided into three sections—ailments of the electric motor, ailments of the air compressor, and ailments of the control.

The electric motor may run slow, heat up, automatically stop at too low an air pressure, run continuously, or run irregularly. In the air compressor there may be knocks or noises, faulty valve action, leaky check valve, or lack of oil.

Ailments in the control of the air compressor may lie in the pressure adjustment, a leak in the diaphragm, or the roller or rocker arms slips.

The first ailment of the motor to be considered is that when the motor runs slow. This can be due only to low voltage, incorrect adjustment of the rocker arm and overload.

To determine the exact trouble, take the belt off the motor pulley and run the motor by itself. If it comes up to speed and the brushes click off within three seconds, you can be assured there is nothing wrong with the motor.

Next, look over the electric wiring between the meter box and the motor. Be sure that all connections are firmly made, and that nothing smaller than No. 14 copper wire is used. Put the belt back on the motor and try the outfit again. If the motor still runs slow, it is quite certain that the trouble is due to either too low voltage or the adjustment of the rocker arm, for overload on air compressor units put out by reputable manufacturers is practically unknown.

Before doing anything to the motor, have the local electric company connect a voltmeter to the line right at the motor. Now start the outfit again. The motors are guaranteed to operate on a 10 per cent variation of voltage. The voltmeter will show the exact voltage being delivered to the motor.

If the voltage falls below the required reading, insist upon the electric company supplying you with what you are paying for. If the voltage reading is all right, then it is necessary to make a slight adjustment of the rocker arm. The book accompanying each motor gives full directions for doing this.

The only case where an overload might possibly develop would be where no lubricant at all had been placed in the compressor, and in running the compressor, so much heat had been generated that the pistons swelled and bound on the walls of the cylinders. This is an exaggerated case, but it has happened.

There is one other cause for a motor running slow—connecting a motor designed for 220 volts to a 110-volt circuit. The motor under such conditions will run very sluggishly. All manufacturers plainly mark the voltage for which the outfit is wired. Be sure you connect it to current of the intended voltage.

The trouble, "motor heats up" can be caused by continuous running under overload or by connecting a 110-volt outfit to a 220-volt current. If the compressor is



"More Attention, Longer Life for Air Compressors," Says C. A. Dickerson.

kept lubricated, there is very little chance of an overload. Always check up to see that current of the right voltage is supplied the motor.

When the "motor automatically stops at too low an air pressure," the setting of the nut of the adjusting screw on the automatic control, should be changed. Two or three revolutions of this nut, clockwise, will settle this trouble. If the pressure is too high, turn the adjusting nut counter-clockwise.

The "motor runs continuously" when more air is being used than is being produced, or there are such serious leaks in the air line that the outfit cannot keep pace with them. Go over your compressor unit, testing every joint with soapy water; then go over the pipe line leading to the outlets, testing every joint. Ninety-nine times out of one hundred, the trouble will be quickly found.

If you will stop to think, there are only four or five openings coming out of any

air receiver. We know that air can not leak through the side-walls, so there is no use wasting time there. There is one opening coming out of the tank leading to the air lines, and one opening for a draincock. Look at these four places, test them with soapy water and, if there are no leaks, the trouble is probably in the pipe line.

There is one exception to this—there is always a possibility of the check valve leaking. A little piece of dirt can get between the valve and the seat so that the valve does not seat snugly. Two or three light taps with a hammer on the bottom part of the check valve will nearly always settle this trouble, as the taps will dislodge the foreign substance.

If tapping it lightly does not stop the leak, unscrew the cap and then you can pick the valve out with your fingers; wipe off the valve and seat with a cloth, and put the valve back again. It is seldom the check valve wears out. Be sure to empty the tank of air before taking the check valve apart.

The ailment, "motor runs irregularly," is practically a repetition of the first trouble discussed—motor runs slow. Ninety-nine times out of one hundred it is a matter of low voltage or incorrect adjustment of the rocker arm.

The inside mechanism of an air compressor is simplicity itself. There is one main shaft with two main bearings. There is but one connecting-rod with one connecting-rod bearing, one wristpin, and one wristpin bushing.

Whenever you hear a noise inside of a compressor, fix it—and fix it quick. Take off the outside cover plate, loosening four or five screws. The connecting-rod is right at your hand, and an adjustment can be made very easily with any ordinary wrench. Take out the cotter pin and give the two adjusting nuts about one-sixth of a turn. This will settle your trouble.

Where the oil level has been maintained too low, there is a chance of wear in the wristpin and wristpin bushing—you can determine whether there is any play there by trying out the connecting-rod with the hand.

If these—the wristpin and bushing—are worn, it is necessary to disconnect the two pistons from the yoke. The bolts are right in front and any ordinary wrench will do. Take the yoke out. You can then easily pull out the connecting-rod and low-pressure piston. You can easily secure a new pin and bushing. Bear this in mind—if sufficient oil is maintained in the machine, wristpin trouble is almost unheard of.

Faulty valve action is another trouble that very often occurs in the air compressor. We find this is very easy to determine. Place your fingers at the suction inlet when the machine is running. There should be a decided suction. If there is, rest assured that there is nothing the matter with the inlet valve.

To test the discharge valves, place the hand upon the discharge pipe close to the head of the compressor. If these pipes are warm or hot, the discharge valves are working all right. There are discharge valves on both high and low-pressure cylinders, so feel both discharge pipes. Valve trouble is very unusual. The foregoing directions, however, will enable one to locate the trouble if there is any.

"Leaky check valves" have already been discussed in connection with ailments of the motor.

"Lack of oil" is one of the principal causes of air compressor trouble. Examine the compressor every morning, if necessary. Machines of the latter designs will run 60 to 90 days without any additional oil. Each machine is supplied with a sight oil gage. Be sure that the oil is kept to the gage level, not above. Oil the motor at least four times a year. Fill and turn up the grease cups on the idler at least once a week.

Ailments of the Control.

"Leak in the diaphragm" of the air compressor control cannot be fixed on the ground. The diaphragm must be returned to the manufacturer. This trouble seldom occurs.

If the air pressure goes up too high, turn the little adjusting nut on the end of the control counter-clockwise two or three turns. If the pressure is too low, give the little nut two or three turns in clockwise direction. It is impossible to vary the range, but you can determine either the maximum or minimum pressure.

The trouble, "roller or rocker arm slips" is very unusual. If it ever does occur, unscrew the adjusting nut just as far as possible without taking it off; jiggle the arm up and down two or three times with the fingers and it will slip into place.

Symptoms of Air Compressor Trouble.

If the air compressor runs continuously, but the gage does not register any increase in pressure there are leaks or the machine is of too small a capacity. Go over all of the joints of the compressor thoroughly with soapy water. Then go over the air line at all the joints. The difficulty should be found without much trouble.

The trouble, "outfits run sluggishly; brushes do not click off of commutator," is due to low voltage or to the use of too small wire from the electric meter to the air compressor motor.

If "air leaks out of the bleeder valve when the machine is at rest" it means that there is a leak in the check valve. Give the check valve a couple of taps with a hammer, not too hard. Ordinarily this

will right this trouble; if not, you will have to clean the check valve.

When air leaks out of the bleeder valve when the machine is running, it means that the little valve in the bleeder valve itself, does not seat properly. Snap the little plunger up and down sharply with the thumb two or three times. This will unseat the dirt that lodges in the seat. If this treatment is not effective, you will have to unscrew the plunger in the bottom of the bleeder valve, take out the spring and little steel ball, and carefully wipe them.

If the "electric motor runs at exceptional speed and heats up," it is due to connecting a 110-volt motor to a 220-volt circuit.

The trouble, "motor runs very slow, labors," may be due to a 220-volt motor being connected to a 110-volt line. The voltage may be low or motor overloaded.

General Directions for Locating Trouble.

Be sure that the electric current is turned on. Take the belt off the motor and run separately. The motor should start snappily, brushes clicking off in about three seconds.

Test the inlet valve by placing the finger at the inlet opening. There should be a pronounced suction. Test the discharge valve by ascertaining whether or not the pipe leading from each cylinder is hot. As long as these pipes are hot, you can be certain that the valves are working.

Look for leaks—soapy water applied to each joint will locate these. A Stilson wrench will fix them easily. Examine the pressure release line. This is the brass tubing from the subbase of the compressor to the automatic control, and from the automatic control down back of the compressor. If air escapes here when the machine is running, clean the bleeder valve. If air escapes here when the machine is at rest, clean the check valve.

It is not necessary to take the bleeder or check valve apart very often. A few light taps with a hammer on the check valve will settle this trouble. Snapping the plunger in the bleeder valve up and down with the thumb two or three times will eliminate that trouble.

Low voltage, leaks, and lack of oil are responsible for 90 per cent of compressor troubles. Use nothing smaller than No. 14 copper wire, and connect the motor of the compressor direct to the outside meter box. Do not run the outfit by connecting to the lighting circuit. Use a good medium grade of lubricating oil.

Take a dish of soapy water and test out the air line every now and then. When installing the air line, use $\frac{1}{4}$ -inch ordinary piping, but be sure that the joints are tight. Shellac or litharge should be used on each joint. See that the paste is spread well around the threads and use plenty of it.

The compressor should be examined at least once a week to see if there is plenty of grease in the idler. It probably will not need oil oftener than once in 60 days—but

look at it every week. The electric motor will probably not require oil oftener than four times a year. Look at it once a month, *to be sure*. The grease cup and the oil hole on the idler should be attended to once a week.

Overhaul the entire equipment once a year. Wash all the parts with coal oil or gasoline, and tighten up all the nuts and bolts. Just a little bit of care, and the compressor will last 30 or 40 years.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 25)

he thinks it is getting hot enough to weld.

He must approach the metal carefully and keep the flame ready to be drawn back instantly. This danger is enhanced by using a filler rod too large. While centering his attention upon the melting of the rod, he is liable to melt out a section of the sheet metal before he realizes it.

In guarding against this overheating, the welder will do well to use the side of the flame more than on other work—that is, the flame is not pointed directly into the weld, but almost flat along the surface of the sheets. This breaks the force of the flame and decreases the danger of holding it too long in one spot. Usually the flame should point in the direction of the welding.

After all, so much of this work is a matter of personal judgment that it is difficult, indeed, to give any hard and fast rules whereby the operator may know exactly what to do in any contingency. Perhaps the best we can do is to give him the idea and let his experience and judgment carry it out. Therefore, a few hints on other lines of sheet metal work are given here.

Take, for instance, fender repairing: Here is a fertile field for the garage welder. Rusted or torn portions may be cut out with the torch and new patches welded in. This is true also of automobile bodies. The torn or ragged edges are cut smooth, so the hole is round or oval, which is better. Then a patch is cut and shaped or dished. This patch should be a trifle larger before dishing than the hole it is to fill. In welding it in place, the same tactics are employed as for sheet metal in general.

When welding split fender seams the operator should remember the action of contraction and not add too much filler metal; barely sufficient to make the seam will lower the danger of distortion. And this filler should be added to the inner side or under side of the fender in order to eliminate grinding or filing afterward. A little distortion may be hammered out of the fender after it is finished.

Most automobile sheet metal work is done with Norway iron filler, but it is often advantageous to use bronze, as it is then unnecessary to melt the sheet iron. The repairing is then done by brazing instead of fusion welding, however.



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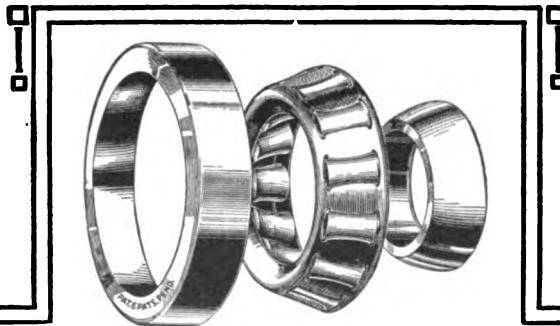
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Practical Hints for Shop Mechanics

Putting in Pistons.

Pistons are sometimes hard to put in the cylinder unless some special tool is used to hold the rings down. I find a piston ring (same size as on the piston to be put in) works nicely.

Simply put the ring over the one on the piston to go in first, then push piston down and this ring will slide onto the next ring with very little trouble.—W. H. B., Ida.

* * *

Clean Carbon With Cloth.

Clean off carbon with a cloth dipped in gasoline, or a brush may be used.

Touch up the points of plugs with an emery cloth, but do not touch emery to glazed porcelain, as it scratches and makes it sput up all the more rapidly. A cracked core must be replaced.—R. C., La.

* * *

Engine Missing Explosions.

A common, yet at the same time, mysterious cause of an engine missing explosions, is water in the carbureter.

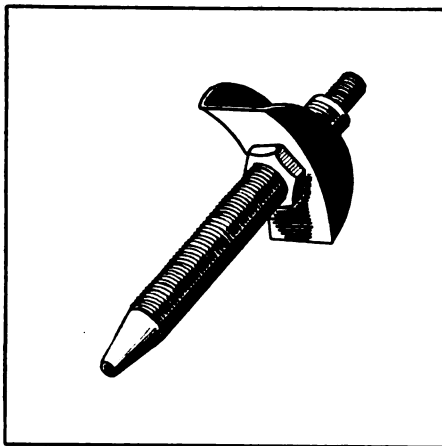
When trying other causes of skipping, try draining the carbureter. Catch some of the fuel in the hand and note if globules form on top. They reveal the presence of water.—A. L., Cal.

* * *

Attachment for Cleaning Parts.

Here is a handy attachment for cleaning parts such as oil or gasoline lines, or other things with air:

Take an ordinary valve stem, such as is to be had from the scrap pile from discarded inner tubes, cut off the base and either file it or turn off the end to a taper in a lathe. Take the spreader piece and fasten it over the stem by means of two nuts,



Old Valve Stem Makes Good Cleaner.

about three-quarters of an inch below the shoulder at the top of the stem. Remove the valve core.

By taking any tire inflating hose in the palm of your hand and inserting the ap-

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Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

pliance in it with the tool protruding between your fingers, you can have full tank pressure to clean with within the range of your tire hose.—A. V. C., Ill.

* * *

Missing Link for Tire Chain.

An "S" hook is very handy for repairing broken cross links. Simply connect the open links with such a hook and close with a pair of pliers and you have replaced the broken link at one-fourth the cost of a new cross chain and your customer will get the same service.—C. W., Mo.

* * *

Removing Stubborn Nut.

A nut that refuses to be moved in the ordinary course may generally be started by heating an open-end wrench which fits the nut and letting it rest thereon for a few minutes.

The wrench may be heated with a blow-torch, but do not heat the nut with the bolt, thereby defeating the object of that torch, because this expands both nut and creation.—L. T., Cal.

* * *

Loose Gear Shift Lever Knob.

If the rubber ball on the gear shift lever continually works loose, remove it and place a heavy lock washer inside of it. If this is not sufficient, use two lock washers with a plain washer between them.—B. P., Pa.

* * *

Keeping Rubber Soft.

A good way to prevent hardening of inner tubes when they are stored for the winter, is to place them in hot water once a month or six weeks.

They should be immersed for just a couple of minutes and should then be carefully dried and partly inflated before being hung up again. This treatment serves to keep the rubber pliable and soft.—M. G., Ind.

The Oil Gage.

The oil pressure gage furnishes a rather accurate means of determining the condition of the engine bearings. As the bearings wear, the oil circulates more freely and the pressure naturally drops.

If the oil gage persistently shows low pressure, it is reasonable to assume engine bearing wear, providing the regulator is all right.—V. M., Ind.

* * *

Removing Overalls.

An easy way to remove the one-piece overall! suits worn by mechanics is to hook the button hole of the sleeve on a nail or hook which is on the wall or other convenient place. Then pull as if another person was helping you to remove them.—P. B., Pa.

* * *

Tube Valve.

Frequent removal of the core of an air valve will generally impair the holding ability of the small rubber washer.

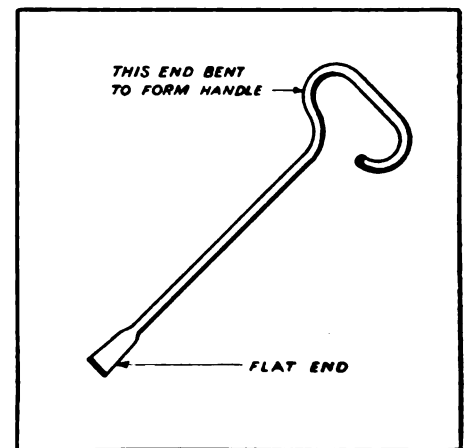
A small screw having a groove lengthwise on one side and threads to fit the inner part of the valve, may be run down so as to press on the core and keep the valve open until the air can escape without its being necessary to remove the core.—L. C., Ga.

* * *

Screwdriver for Headlight.

Those who have experienced headlight trouble, due to the screws loosening in the connections, will generally purchase a small screwdriver at once. But if you are caught without one, here is the method of procedure:

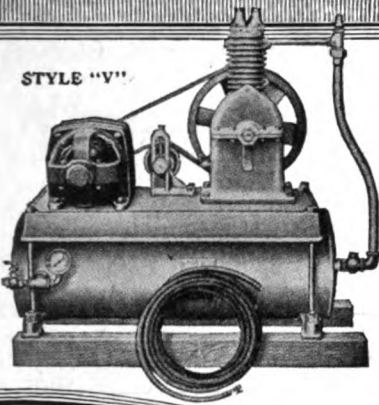
Most tool boxes contain a broken or spare spark-plug. Take pliers and remove



No Small Screwdriver? Try This.

the central wire or electrode. Lay one end on the axle and hammer flat like a screwdriver blade. Then bend the other end for a handle. A piece of No. 12 wire might be used in a pinch.—W. R., Mo.

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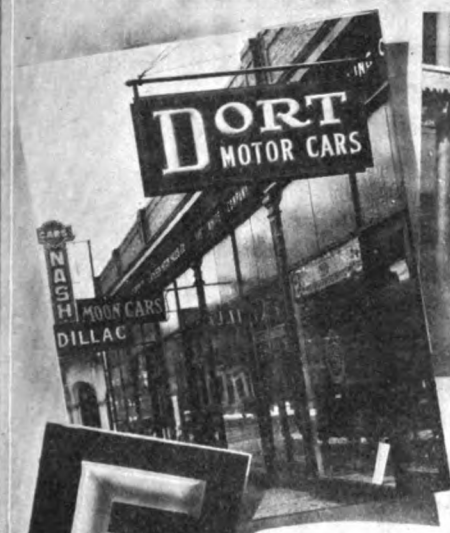
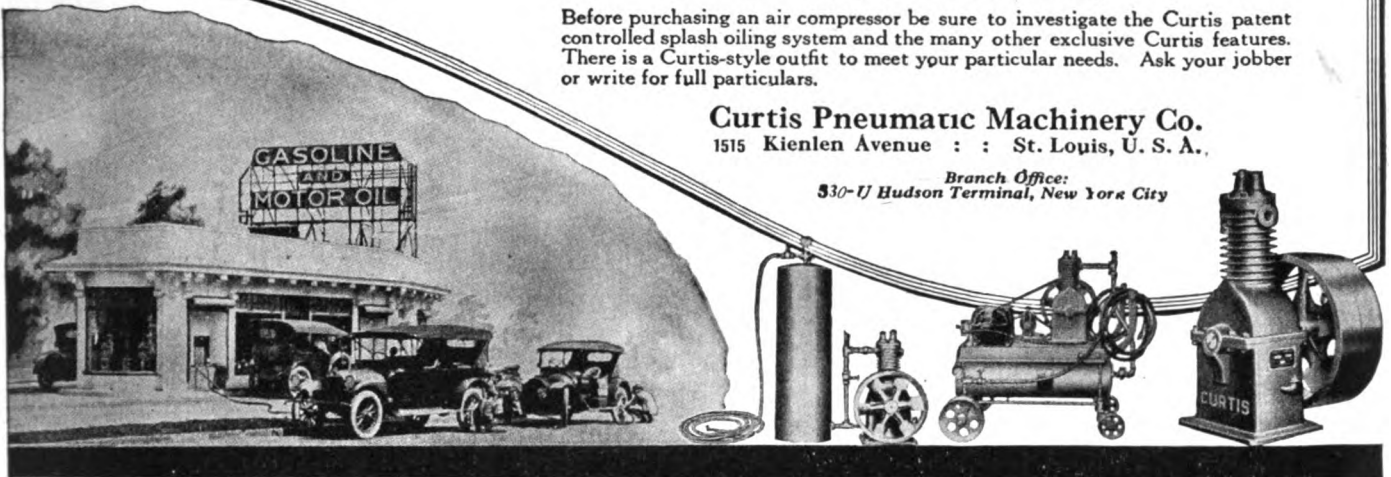
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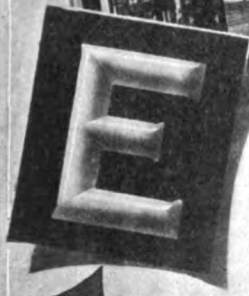
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Repair Hint for Scored Cylinders.

The next time you get a Ford with a scored or worn cylinder, take an old piston and saw the top off. Then saw it lengthwise on one side. If you have a couple of old connecting-rods, discard the caps and bolt the large ends together.

Next take a three-fourths inch rod about one foot long and place in one wrist-pin end for a handle. With an old wrist-pin, assemble the prepared piston on the other. You now have a first-class lapping tool. You can wedge apart the opening in the piston with shim stock until you get the proper drag.

Use as you would in grinding valves back and forth, and be sure to go the full length of the cylinder, and use only a very fine grinding compound.

When the cylinder is smooth, you will likely need an oversize piston. If that be too tight, lap it in as before.

Be sure to wash the cylinder carefully with gasolene.—C. H. R., N. Y.

* * *

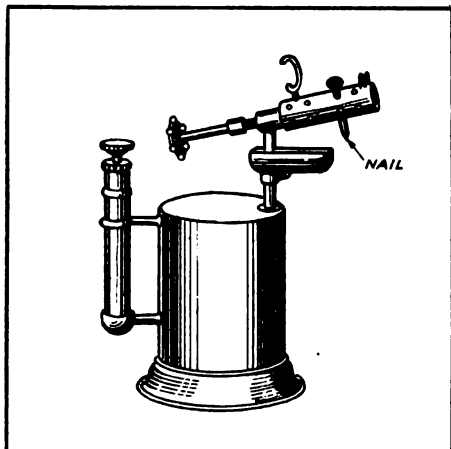
Coating Compound.

A satisfactory compound for coating both the inside and outside of tires is made by stirring five pounds of whiting into a quart of gasolene and, after a thorough mixture has been obtained, adding a quart of rubber cement.—L. S., Kans.

* * *

When Blowtorch Goes Out.

There are many "good" blowtorches that give poor service on account of poor gasolene. By inserting a nail through the second hole from the outer end of the barrel



Nail in Blowtorch Barrel Helps Flame.

and leaving it there to retain the flame, much better results can be obtained.

This is only practical when the torch has a tendency to go out without any visible cause.—P. R. D., Ill.

* * *

Time-Saver in Cleaning Parts.

For cleaning all kind of parts, especially the differential and rear axle parts when overhauling, get a galvanized wash-tub—an old one will do. Fill or cover the bottom with about three inches of dirt and you are ready.

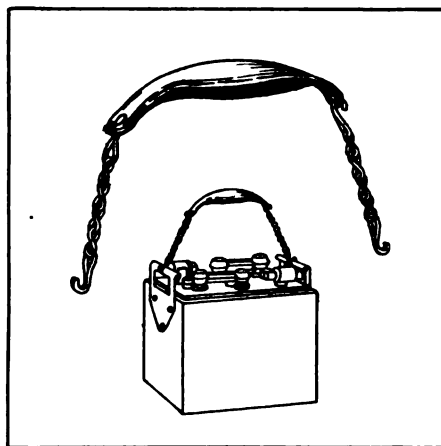
Take the part to be cleaned and lay it across the tub. Pour a little gasolene over it and light. When the part gets hot, or the grease has run off pretty well, take out and be sure that all the flame is out on the part. Then, with a can of gasolene, or a cut oil, rinse off, and you have a perfectly clean part and can detect any trouble.

This method may be used for cleaning almost every part of an automobile. For some parts it is necessary to use some judgment about how hot to get them or you will spoil a bearing.—G. H. M., Ga.

* * *

Battery Remover and Carrier.

Attach two Weed cross chains to the ends of a piece of eyed steel, 6 inches



Useful Device for Removing Batteries.

long, that has been shaped to suit the grip of a hand as shown in the accompanying illustration. Open the hooks on each end of the chains so that they will slip over battery handles.

Such a device will be found very useful in removing all makes and sizes of batteries from difficult places. It is also useful for carrying batteries around the garage.—A. G., Ore.

* * *

End Play of Ford Shaft.

A number of Ford cars are hard to start after they have been run awhile owing to the fact that the fillet becomes worn on the front end of the rear main bearing cap. Many times the looseness is only lateral, but to take the end play out of the shaft and to give the magneto the proper clearance it is necessary to take the motor out. The end play may be taken out without removing the motor by taking the center main bearing cap down and building up the fillets, and by prying the crankshaft forward. Then fit the cap to take out all end play.

A better way to prepare the cap is to have a Ford block out and lay a crankshaft in it and rebore your cap. I make it a point to take all my old center main caps and rebore them and thus have them ready for an emergency. With the caps all ready, the repair mentioned can be made in about two hours.—A. V. C., Ill.

Sticking Valves.

Tire valves which have stuck and from which the tops have been sheared off, or which cannot be handled with the tire tool in the ordinary way, may be removed as follows:

Take a small three-cornered file and drive it down in the center of the valve core with a hammer, then use the file as a handle to unscrew the valve.—A. L., Cal.

* * *

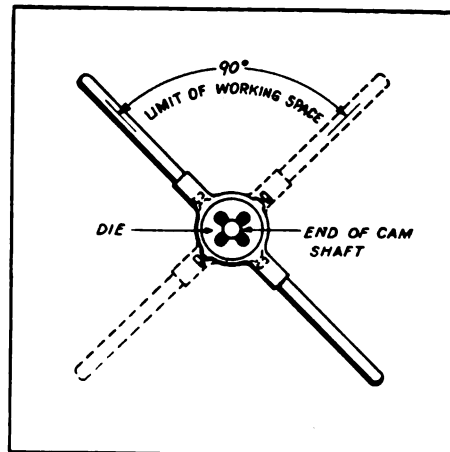
Rethreading Ford Camshaft.

Recently I had occasion to renew the threads on the forward end of a Ford camshaft. This, under ordinary conditions, would require the removal of the camshaft from the motor. After some consideration and thought over the job, I managed to cut new threads on the camshaft without removing it from the motor and completed the job in its entirety in ten minutes. The job ordinarily would have required from two to three hours.

In my garage equipment I have a set of G. T. & D. Co.'s taps and dies. The dies are retained in the stock by two set screws, and are countersunk in two places on opposite sides, or 180 degrees apart. The dies are of such size that a die brace cannot be used, and also the space in which the stock must revolve in this work is limited to about 90 degrees.

The breather pipe tee interfered with the revolving of stock. By tightening the set screws against the side of the die, it was revolved to the right, or clockwise, 90 degrees, when the set screws were released and the stock turned to the left, or counter-clockwise, 90 degrees, the die remaining stationary on the end of the camshaft.

This operation was repeated until the full length of thread was cut on the camshaft.



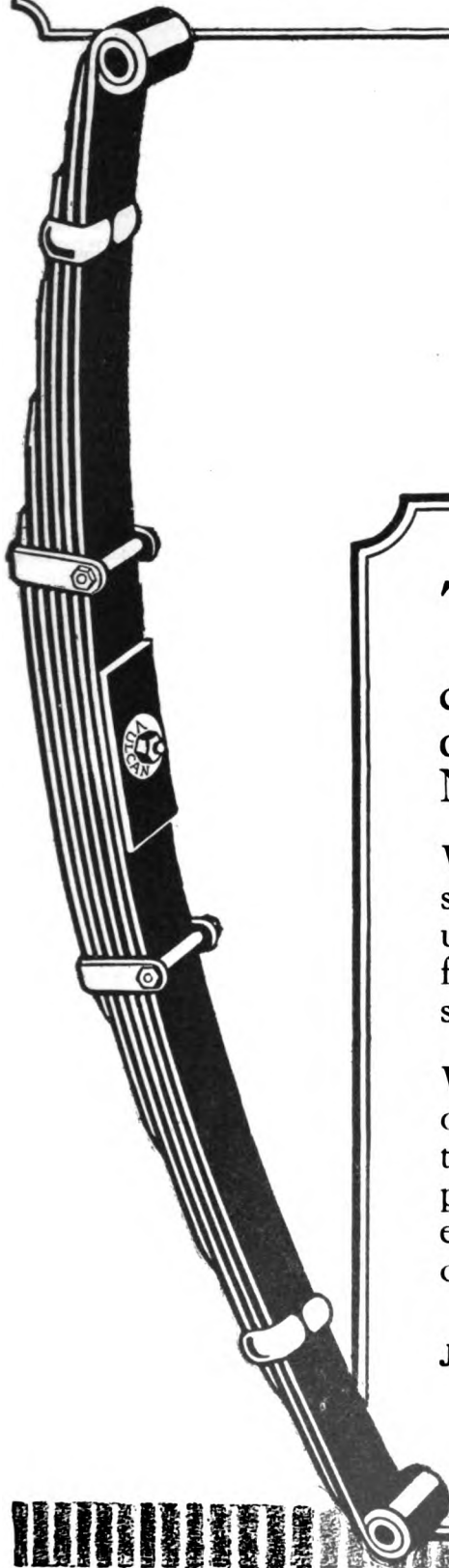
Method of Using Die Stock.

The accompanying sketch shows the idea. The set screws are tightened when the die stock is in the position indicated by the full lines and loosened when in the position shown by the broken lines.

What would otherwise have been quite a job was reduced to a minimum, and yet commanded a good profit.—E. L. H., Va.

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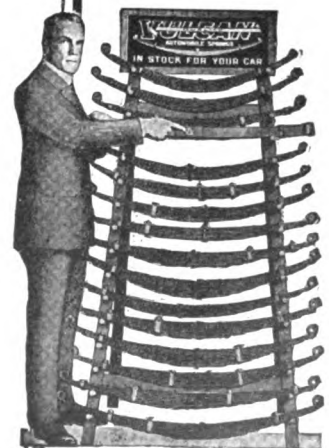
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Readers' Questions and Answers

Radiator Cleaning Solution.

Will you please tell me how I can get rid of the troubles which I will try to describe to you.

I have a radiator on a H A L-12 which is stopped up on one side of it. The other side seems to be very clean. I can get a good circulation on one side but the other seems to stop up tight. I put a pressure of water through the plugged side and it circulated pretty good for a while and then stopped again. There seems to be a lot of ravel like waste in the honeycomb. Don't know what it is or how it got there and why it is only on the one side.

I have tried salsoda and a pretty strong solution of lye water, but neither seems to do any good. I am afraid to use too strong a solution for fear I will burn the radiator up.

Can you give me remedy for this? If so, I will appreciate it very much.—M. S. G., Fla.

The accumulation in the passages of the radiator you speak of may possibly be cleared by the following solution and treatment:

First drain the water from the car thoroughly; close drains, and introduce the following solution into the cooling system: 4 fluid ounces, sulphuric acid into 10 gallons of water.

Run motor at moderate speed for 30 minutes; again drain the cooling system and refill with clear water and run the motor for 10 minutes. Drain the system and refill with a solution of 3 ounces caustic soda and 3 ounces of carbonate of soda or soda ash in 10 gallons of water. Run the motor moderately for 30 minutes; drain again and refill with fresh water and run the motor 20 minutes more; drain and refill with pure water and operate as usual.

If this treatment does not remove the accumulation, we suggest that a hole be carefully cut on the bottom of the radiator large enough to admit an air hose to the suction or side of the radiator obstructed. By using a few pounds of compressed air and passing the hose over the ends of tubes obstructed, we believe the accumulation can be blown out through the top. The hole may be covered with a patch of copper of the proper gauge, and soldered. Flush the radiator from the bottom after with clean water.

* * *

Boiling in Radiator.

A Ford was recently brought into my shop and the owner complained that the radiator water boiled after the car had been running seven or eight miles. What is the cause?

This car has a generator run by a chain-belt from the fan shaft. Can this have anything to do with the overheating?—R. F., La.

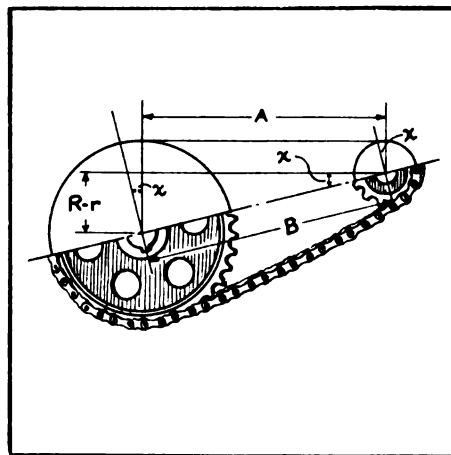
If the belt that drives the fan is not sufficiently tight, it will not turn either the

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

fan or the generator at full speed and the radiator will become unduly hot and the generator will fail to produce the usual amount of current.

If, by taking hold of the blades of the fan, it can be turned with hardly any re-



Determination of Chain Length.

sistance, it is probable that the belt is not tight enough and should be tightened. If this does not stop the boiling, clean out the radiator with washing soda solution. Make sure that the spark is as much advanced as it should be, see that the muffler is not clogged and instruct the owner to run on as lean a mixture as possible.

* * *

Repairing Ford Rear Axle.

I take pleasure in asking a question in regard to the repairing of a Ford rear axle.

I fully understand its construction and know each and every part and where

they belong, but in replacing a new ring-gear, pinion, or thrust washers, and I might add bearings, it seems that I am unable to assemble it without causing a grinding noise. Of course, this noise will leave in a short time but I know it can be assembled in the first place without it, and I usually have had to disassemble and reassemble several times before I can eliminate it.

Is there not a way to tell, while assembling, whether or not the ring gear is in the right position to mesh properly with the pinion gear? I know its position is adjusted by the thrust washers, and the regular Ford washers are supposed to hold it in the right place—but they never seemed right when I had occasion to use them.—H. B., Pa.

We believe your trouble is in meshing too deeply the ring-gear with the pinion-gear.

We know of no way of determining this until after the housing is bolted together, in which case some resistance would be offered in the movement of the differential.

We advise using complete sets of new thrust washers, where any new washers are required, instead of some new and some old or worn.

* * *

Calculation of the Length of Chain.

At your earliest convenience, please publish a method for calculating the length of a chain, when the diameters of the two sprockets around which the chain operates are known.—A. R., Kans.

Reference to the accompanying sketch will make clear the method for calculating the length of the chain, all dimensions being in inches. In the formula which follows, let

B = distance between centers.

A = distance between limiting points of contact (see illustration).

R = pitch radius of large sprocket.

r = pitch radius of small sprocket.

N = number of teeth in large sprocket.

n = number of teeth in small sprocket.

P = pitch of chain and sprockets.

$180^\circ + 2x$ = angle of contact of the large sprocket.

$180^\circ - 2x$ = angle of contact of the small sprocket.

The total length of the chain is found by using the formula:

$$L = \frac{180 + 2x}{360} NP + \frac{180 - 2x}{360} nP + 2B \cos x.$$

$$\sin x = \frac{R - r}{B}$$

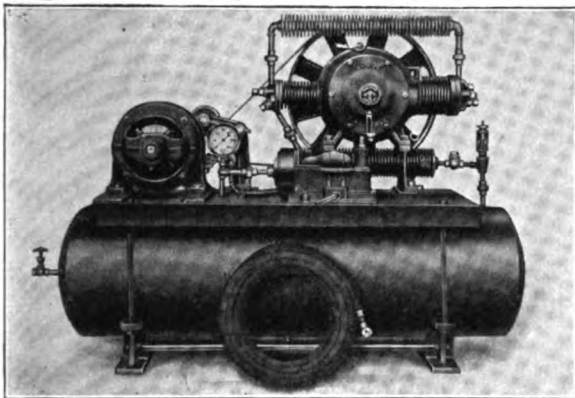
$$A = B \cos x.$$

For a block chain the total length ordered should be a multiple of the pitch, while for a roller chain it should be a multiple of twice the pitch, since an outside and invisible link are required for joining the ends.

3

3 Reasons Why

the Gardner Two-Stage Air Compressor minds its own business:



It works for you without any need of bother or attention month after month—a silent, powerful workman—more than a workman, it is a forceful salesman for you, attracting friends and customers to your garage.

—a little oiling and cleaning now and then (and less of that than with most air compressors). That's all the attention you give to the Gardner, while year after year it works on for you and your garage.

C. A. DICKERSON
614 Fisher Building
CHICAGO, ILL.



Tear Out and Send to

C. A. Dickerson
614 Fisher Bldg.
Chicago

Please send me your colored circular explaining in detail the "3 Reasons Why" the Gardner Two-Stage Air Compressor minds its own business

Name.....

Address.....

City.....State.....

Wiring Diagram Chalmers "Six-30."

I should like very much to see a wiring diagram for the Chalmers "Six-30." Will you not publish this diagram when you have an opportunity?—A. M. D., Ky.

We are printing the wiring diagram for the Chalmers "Six-30" on this page.

* * *

Sulphating of Storage Battery.

What is the definition of the term "sulphating" as applied to storage batteries? Also what is the cause of sulphated plates and can they be repaired?—J. P., Minn.

When a white chalk, which is an insoluble non-conductor, forms on the negative plate, the plate is said to be sulphated. It is caused, as a rule, by lack of water over the plates. Sometimes sulphation takes place when a battery is left standing for a long time without charging. Sediment in an impure electrolyte may also be the cause.

A sulphated positive plate can be remedied by charging, but this is not the case with a negative plate, if too far gone. The only hope here is for a battery expert to repair it by a long continued charging at a low rate.

* * *

Correcting Headlight Trouble.

Can you tell me what to do to correct a headlight on a Model 1916 Mitchell? The right-hand lamp only burns about half as bright as the light on the left side.

I have done everything that I could think of but can not locate the trouble. —A. H. W., Fla.

Your trouble with the headlight on the car mentioned, is perhaps due to one of the following causes:

Bulb of improper voltage, filament of the bulb deteriorated from long use, or perhaps a poor contact in or about the socket of the headlight. We suggest that you try a new bulb of the voltage corresponding with the lighting system; also see that all wiring connections are properly made and securely fastened, and examine the socket in the headlight to see if the bulb is making proper contact. See that the wiring is in good condition.

* * *

Correction for Missing in Reo.

I have a Reo, factory serial No. 55538, that does not hit regularly. Change of carburetor does not seem to help it. It does better when it gets warmed up but does not pull or speed as it should, considering that the motor has been rebuilt, oversized pistons and rings ground in, valves resealed and faced, new main bearings reamed so as to raise the crankshaft a little higher than the original, new connecting-rod bearings so as to tighten upon compression, new piston pins, and crankshaft bearings re-turned. Generator and starter are in good shape.

It seems to me that the exhaust opens too early. At half-way down on the explosion stroke, all the slack is taken up; at a very little past half-way down on explosion stroke, the exhaust valve starts to open and before the piston reaches the bottom, the valve is wide open and does not seat until the piston has reached the top and started down one-eighth inch. Intake opens just before the piston reaches the top.

This timing was carefully checked off by myself and another gas engine man, considered to be the best in this town. Do you think a vacuum tank and the taking out that long manifold would help?—F. W. B., Texas.

The valves should be checked with the corresponding marks on the flywheel of the

motor. If they do not check up correctly, it is an indication that the cam gear on camshaft, or the camshaft itself, is improperly set and should be corrected.

Your trouble, however, points to a leaking intake manifold, or worn intake valve stems or guides, allowing too much air into the mixture above the carburetor. This will sometimes cause misfiring at certain speeds, in one or more cylinders, depending on the location of the air leak. Frequently this trouble is caused by a crack in the intake manifold where it is bolted to the cylinders.

We do not believe a vacuum tank and the shortening of the manifold would eliminate this trouble. The vacuum tank and system could be used if you are having trouble with the gravity system in getting fuel to the carburetor.

* * *

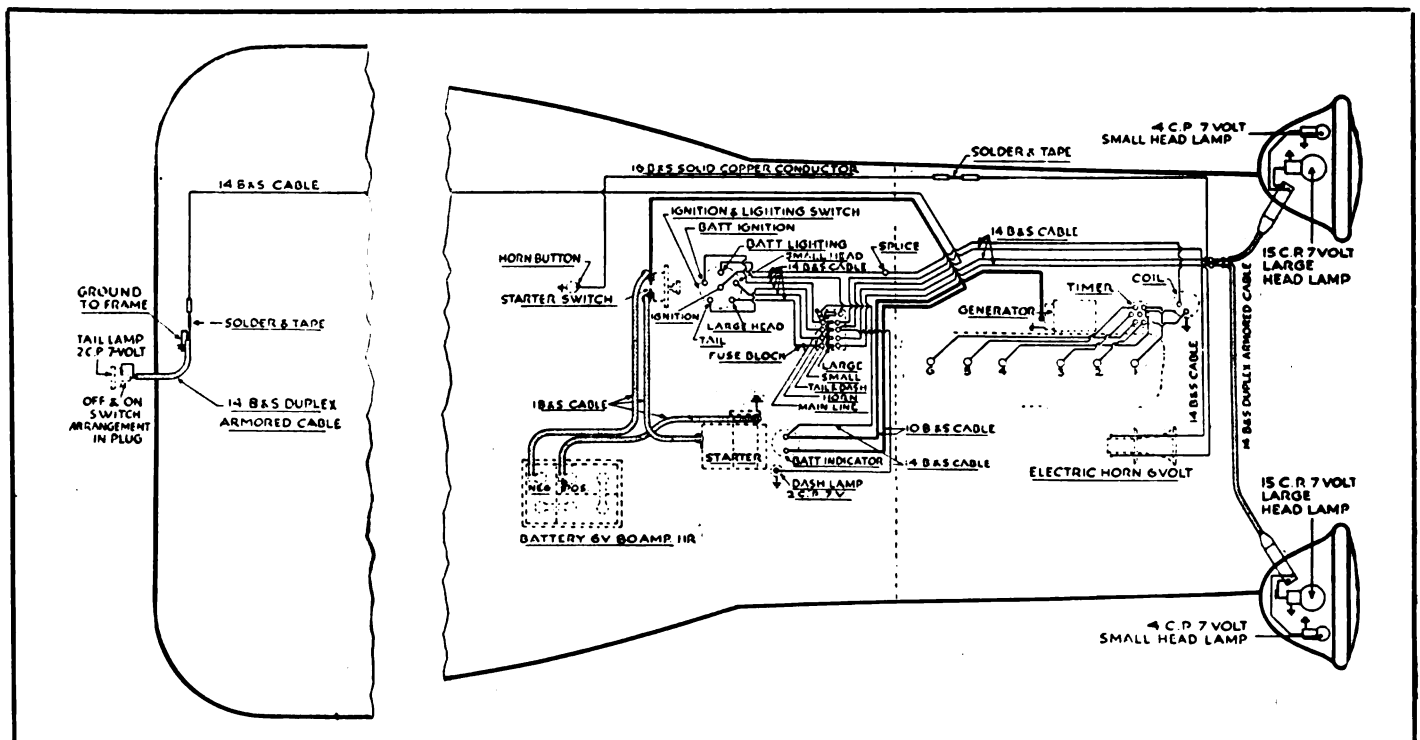
Building Up Main Bearings of Ford.

Can you tell me how to build up main bearings of a Ford to take up end play? What is the best material to use for this? —A. L. S., Iowa.

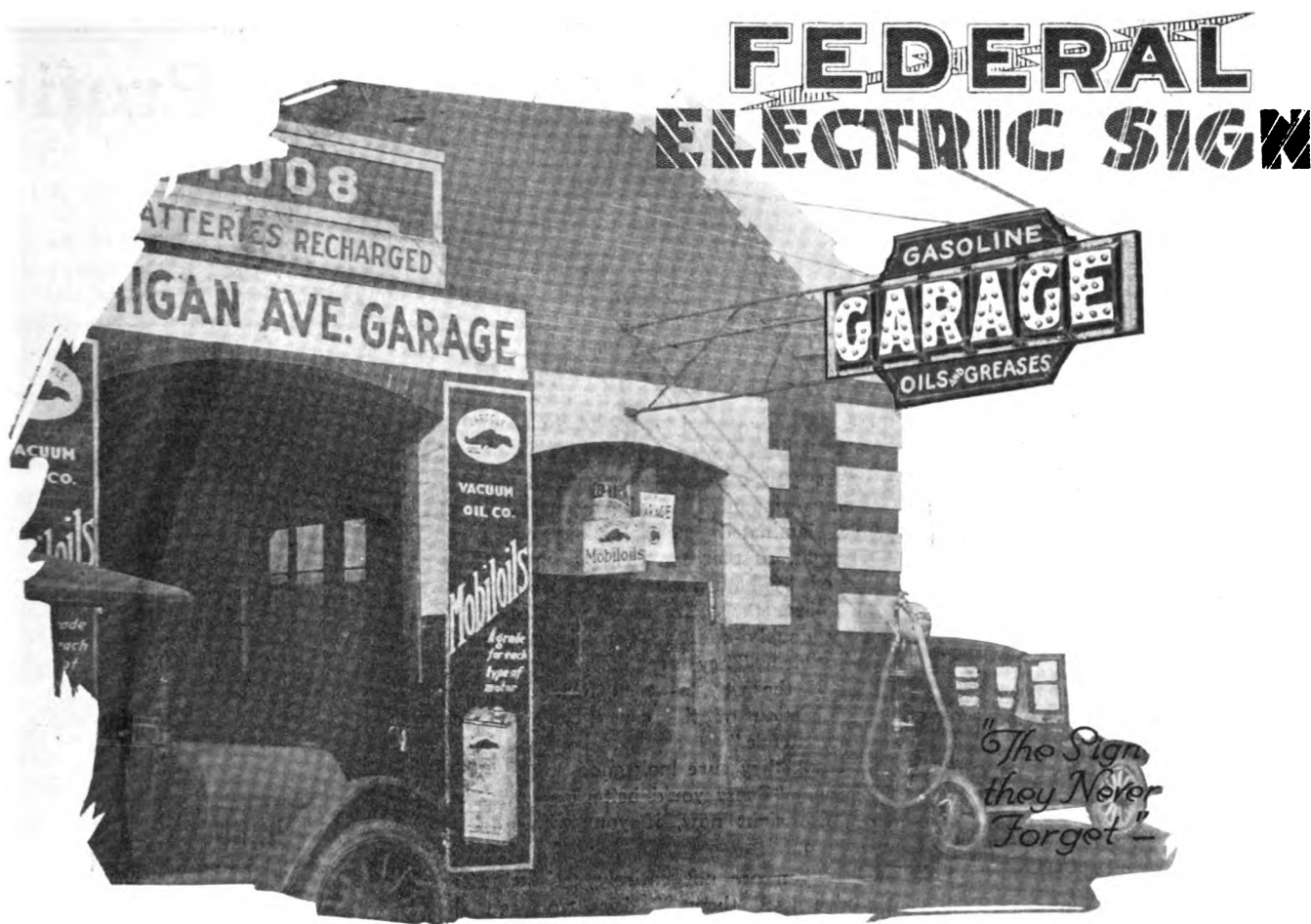
The worn ends of the main bearings in a Ford motor could possibly be built up by running babbitt metal to the worn ends, but we believe this would be a difficult proposition and would no doubt render unsatisfactory service. However, the main bearings may be re-babbitted.

There are several tools on the market for this purpose, one of which is sold by the Storm Mfg. Co., Minneapolis, Minn. This tool furnishes the proper forms for pouring the metal; also maintains the alignment of the bearings.

Any good grade of babbitt metal should give satisfactory service.



Wiring Diagram for the Chalmers "Six-30" Car.



—Make Your Garage Front Produce More Business

When you have an energetic salesman in the form of a glittering electric sign in front of your garage, you sell not just the person who happens to drive by your garage—but the hundreds of people who drive within a block or two in each direction, as well as on the cross streets.

That is where a Federal Electric sign proves such a big business getter—its cheerful invitation is irresistible. It says, "Here is the

'House of Service'—drive in." It attracts tourist trade like a magnet.

A Federal Electric sign pays for itself many times over for many years to come—made of porcelain-enameled steel, cannot rust, rot or decay—will last indefinitely. As a progressive garage owner, you should not overlook this opportunity to gain a step on competition. Send coupon today for full information and **free sketch** showing how your **sign** will look. No obligation.



12 Months to Pay!

The first payment brings you your sign—you have 12 months to make the final payment.

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information, price and free sketch of a Porcelain-enameled Steel Sign for my business. Explain your 12-months-to-pay Plan.

Name City State

Street and No. Business

Store Frontage No. of Floors

AGAD-3

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Accessories—Dealers' Key to Profits

Customers Like Alsprings—They Mean Fewer Blowouts.

Pop! Pop! Elston halted his car with an exclamation of disgust and consternation.

"A blowout," he grumbled, "and I'm late, now. Good thing I have that extra tire, but it will be a case of pure luck if I make that meeting in time."

He was still five miles from his destination, an important business meeting which meant the possible gaining of a contract involving thousands of dollars.

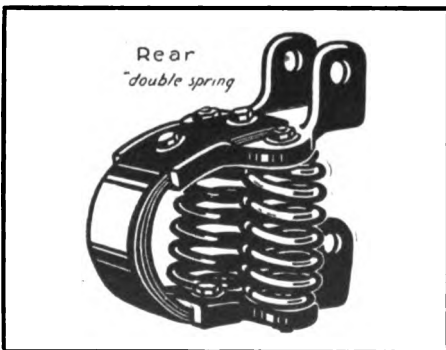
"Something wrong somewhere," he muttered. "I'm having more blowouts lately than are justified considering that I buy the best tires available."

He made the tire change as quickly as possible and did make the meeting, but with only a small margin of time.

Before starting on the return trip he stopped at the shop of the leading automotive dealer of the town to purchase an extra tire and, impressed with the appearance of the shop and the competent manner of the proprietor, told of his difficulty and asked an opinion as to the reason for the unusual frequency of blowouts.

The proprietor smiled. "I believe your difficulty is one that is quite easily remedied, Mr. Elston. I am sure that if you will have a set of Alspring shock absorbers installed you will find you are saving materially in tire expense. As a matter of fact, severe jolts and bumps are the cause of many tire blowouts. By softening the impact on the tires, the Alsprings prevent blowouts."

"More than that," he continued. "Every jolt and bump affects some part of your car. Continual vibration and bumping will eventually weaken and break some vital part and wear the parts dependent upon it.



Alsprings Mean Fewer Blowouts by Softening the Impact on Tires.

By minimizing all this, Alsprings reduce your upkeep. When you go over rough places and must use low gear, you are using up gasoline and all bumps, twists and strains also eat up extra gasoline. So

you see, Alsprings mean a saving in maintenance of your car in other ways than tires."

"Last, but not least," he added, "they increase your comfort. These shock absorbers save you many jars and jolts. They are easily installed, too. In the words of the clever advertising slogan used by the manufacturers, they are 'put on with the same two bolts you had before without the jolts that made you sore.'"

"As you can see, they consist of coil springs, mounted within a curved, flexible, laminated steel spring of great strength, so that the road shocks are absorbed by both features, yet neither one must bear the entire burden. This makes them doubly effective and virtually indestructible. They are inconspicuous and out of the way, as they form a natural continuation of the car springs and do not protrude."

"Well, they sure look good to me," said Elston. "Guess you'd better put a set on my car right now, if you will. I'll try them out."

"If you are not entirely satisfied after you've used them 30 days, you can return them; I'll give you your money back," said the dealer.

The Alspring shock absorbers which were sold Elston are manufactured by the Alspring Shock Absorber Mfg. Co., 201 S. Seventh St., Minneapolis, Minn., who will gladly furnish further details upon request. Don't forget to mention the American Garage & Auto Dealer when writing.

Users Find the Protex-A-Cap Protective and Ornamental.

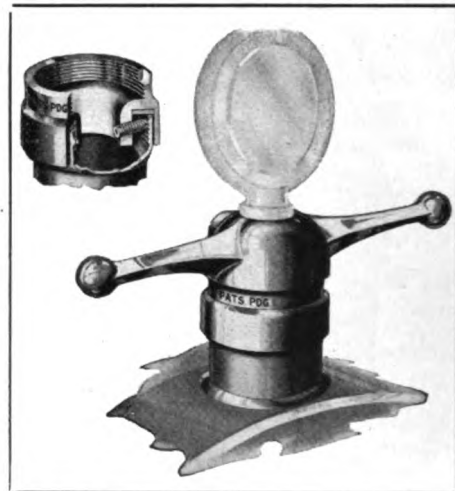
The rapidly increasing thefts of motors and radiator caps have caused a demand for a lock-cap that is both protective and ornamental. In answer to this call, The Zinke Co. is now putting on the market a new Protex-A-Cap which it claims meets every demand of the most fastidious car owner.

From the protection standpoint, this lock-cap is said to be 100 per cent efficient, being locked in place by an eight-tumbler lock with over 1,000 key changes and no master key, precluding the possibility of professional thieves being provided with keys to fit.

The action of the lock forces a hardened steel bolt into a slot in the adapter ring, which is secured to the radiator neck by three cup-point set screws, seated from inside the ring. These screws are forced tightly into the inside of the neck by means of an "L" wrench, furnished with each cap, and the cap when seated fits

into the neck so that twisting off is said to be utterly impossible.

The adapter is described by the manufacturer as being in the utmost degree universal, fitting all radiators with screw



The Fastidious Like the Protex-A-Cap.

caps except a very few special models with caps of abnormal size. This, of course, appeals to the dealer who need carry but one style of cup and no extra parts.

From the ornamental viewpoint, the graceful design, with long, diamond-section arms tapering from the cap to the ball ends, makes the Protex-A-Cap one of the most attractive of radiator trimmings. The cap and adapter ring are made of rust-proof white metal, highly polished and nickel-plated.

A valuable feature of the Protex-A-Cap, to owners of cars kept or occasionally placed in public garages, is that it prevents unauthorized persons from interfering with any freeze solution or filling the radiator with greasy or dirty water that will clog the radiator passages.

The Protex-A-Cap, as delivered, is closed at the top so that it may be used without a heat meter or other ornament, but an indented ring on the inside allows the center to be easily removed giving the proper opening for the meter.

Sales are handled through recognized jobbers only by The Zinke Co., 1337 Michigan Ave., Chicago. When writing this company, please mention the American Garage & Auto Dealer.

The Weston Heavy Discharge Battery Tester.

The Weston model 453 heavy discharge battery tester is intended for testing the voltage of each cell of the battery while a relatively heavy current is flowing. It consists of a well-designed substantial prod, upon which is mounted a direct-cur-

Non Freezing "PEP" Non Drying

GRINDING COMPOUND



has set a new standard in valve grinding

The illustrations give you some idea of the results obtained by "PEP" as compared with an oil mixed abrasive.

Water-mixed "PEP" not only does incomparably better work but does it much more quickly and profitably. "PEP" seats a valve in **one operation** because only **one grade** of abrasive is required for cutting and finishing. The job is done in **half the time** ordinarily required—and at half the cost.

Your mechanics will like "PEP" because it is clean and convenient to use. Only a water dampened cloth is required to wipe the valves before and after grinding.

Try "PEP" once, and you will always use it. You can thoroughly test "PEP" at our expense by sending the coupon to your jobber. Mail it today.



Worcester Abrasive Co.

1662-1664 Broadway, New York City

Refer to list of jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book"

FREE

WITH YOUR JOBBER'S O. K. ON THIS COUPON WE WILL SEND YOU A HALF-POUND CAN OF PEP (Value \$1.00 List) FREE

FREE

Your Jobber wants to sell you the BEST Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a half-pound can (value \$1.00 list) under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a half-pound can of PEP (value \$1.00 list) for testing purposes. I will let you know the results of this test.



JOBBER'S O. K.

Please send the party whose name is written above, a half-pound trial can of "PEP."

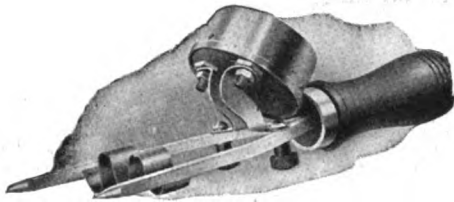


1662-1664 Broadway **WORCESTER ABRASIVE CO.**

New York

rent voltmeter having a range of 3-0-3 volts.

The prod has two prongs securely fastened in a wooden handle, which are spaced so that they can be pressed into the cell terminals of the standard automotive batteries. Connected between the



Battery Tester Will Measure 200 Amperes.

prongs is a special alloy-conducting strip of approximately 0.01 ohm resistance, through which approximately 200 amperes will flow when two volts are applied across the prod.

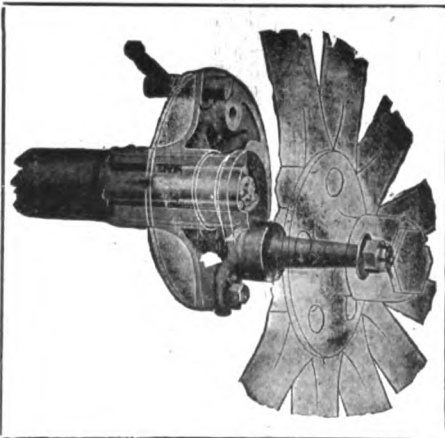
The voltmeter is a Weston model 301 with a legible and easily-read scale. The instrument and prod are furnished in nickel finish only.

The Weston Electrical Instrument Co., Newark, N. J., will gladly furnish further details concerning this battery tester. When you write to it, please mention the American Garage & Auto Dealer.

When A Slipon Emergency Repair Axle Saved the Day.

"Oh, if there were only some way of repairing the axle just to last until we could get home," complained Mrs. Fordowner to the sharer of her joys and sorrows who stood moodily contemplating the broken rear axle of his car.

"Well, there isn't," said he, "Only thing



Preparedness—You Have It With the Slipon.

to do is to walk to that house up the road and try to telephone some garageman to come out and tow us in. It's a darn shame that it broke way out here. No telling when we'll get home."

Just then the driver of a passing car halted his car with a cheery "Hello friend, anything I can do?"

"Guess not," replied Fordowner, "It's a broken axle."

"Oh, is that it? Well, then, I can help you," volunteered the other.

"I don't see how," puzzled Fordowner, "But I'm willing to be shown."

The "friend in need" got out of his car and, after fumbling a moment in his tool box, produced a small steel mechanism about a foot long which he carried over to Fordowner's car. He jacked up the car, removed the Hyatt roller bearing from the housing, placed the device, with the axleshaft in an opening provided for it, screwed the brakeband bolt through the slot into the brakeband drum, and inserted three grooved rollers into the three largest parts of the opening.

Then, he put on the wheel, washer, castellated nut and cotterpin, and the job was done. He had taken the hub cap from the front wheel and taking some grease from it, had placed it on the repair axle. Then he put the rear hub cap on the front wheel and the front hub cap on the rear wheel.

The entire job had taken him no more than seven minutes.

"Now, friends," said he, smiling, "You can go on your way in perfect safety. This Slipon emergency repair axle will carry you wherever you may be going, no matter how far it is, without any more trouble."

"Do you mean to tell me that axle is sound enough with just that, to risk driving 20 miles with?" demanded Fordowner.

"Exactly so," answered the other. "The Slipon is made of the best steel, carefully machined. The washer with the key that fits in the keyway of the taper wheel bearing, prevents it from turning off and falling in the road. The nut for the end of the taper against the washer is castellated, and the three little rollers which you saw me use, are of hardened steel. As you saw, also, I used only the one bolt to hold the Slipon to the brake drum. Then the three fluted rollers lock the broken shaft, permitting the sound axle to drive the car."

"I am certainly indebted to you," said Fordowner. "O course, I want to pay you for this now, but I'd like to have you tell me where I can get these Slipon repair axles in case I should ever need another, and besides I'd like to tell some of my neighbors who have Ford cars about it."

"Glad to have helped you," was the answer, "I am a garageman over here in Nextown and I have a supply of them in my accessory stock. I've had quite a few of these broken axle complaints and so one day when I saw the Slipon advertised in the American Garage & Auto Dealer, I just sent for a few of them to try them out."

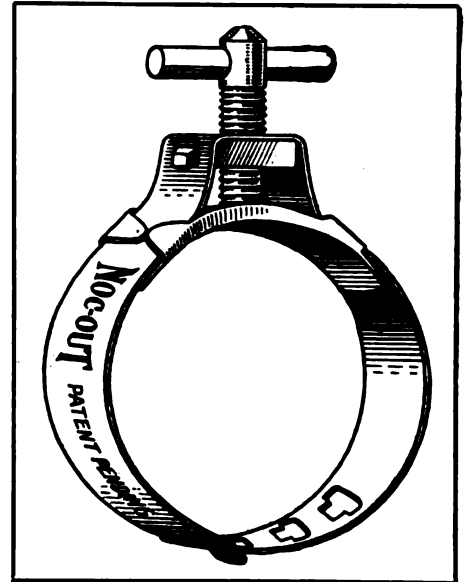
"They proved so satisfactory that I always keep them on hand now. My customers are all pleased with them. I never start anywhere in my own car without taking one along. However, in case my place is too far for you, you should be able to get them at most any accessory

shop. If not, you can send direct to the manufacturer, The Slipon Co., Milwaukee, Wis., who will send you its prices and booklet on request."

The One-Piece Clamp That Saves Your Hose.

Theodore Roosevelt said, "Thrift is common sense applied to spending." Money spent for devices which will save time and that also save wear of equipment must certainly be considered as common-sense spending.

The R. T. Mfg. & Sales Co. assures us that its new "Noc-out" hose clamp, now



The New "Noc-Out" Hose Clamp.

being placed on the market, is a real money-saver. A one-piece clamp, made to fit two or three sizes and any thickness of hose connection, it can be applied without the use of a tool, and the construction is said to be such that it does not cut or buckle the hose.

The manufacturer claims for this newly-patented device that it is the latest invention in design and construction of hose clamp.

It is supplied in seven sizes, ranging from $\frac{1}{2}$ inch to $3\frac{1}{4}$ inches, and is made of high-grade, non-rusting material.

The R. T. Mfg. & Sales Co., 3847 West Madison Street, Chicago, Ill., will gladly supply further details concerning the "Noc-out." Please mention the American Garage & Auto Dealer when writing.

The Utilitarian—A House Organ of Quality—For You!

When you get a moment's time, drop a line to the General Utility Co., 1326 Ogden Ave., Philadelphia, and ask it to place you on the mailing list to receive copies of the Utilitarian, its house organ.

You will find this little booklet, which will reach you monthly, a "live" one in every sense of the word. It is a compilation of concise, straight-from-the-shoulder articles full of business wisdom.

Increase Your 1921 Tire and Battery Profits With 1921 Products and Equipment



1921 Model Bead Cutter

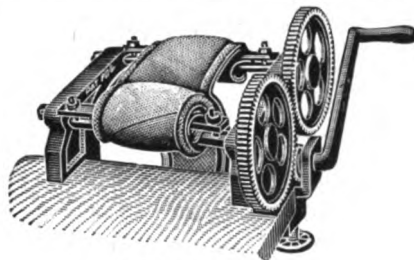
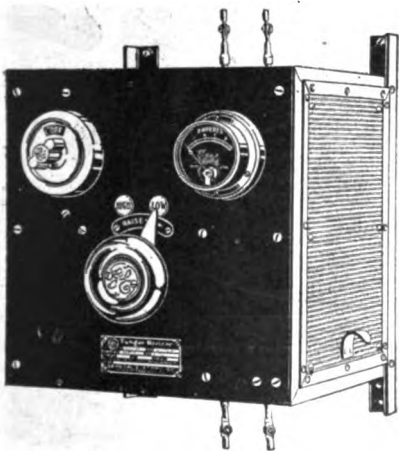
The machine that will make an easy job of cutting the bead off old tires you strip down for re-liners or use as tops for double treads.

The head raises and admits the tire. The lever pulled down locks automatically. No screws or clamps to fasten. Blade is removable and can be renewed.

Price, f. o. b. Chicago.....\$25.00



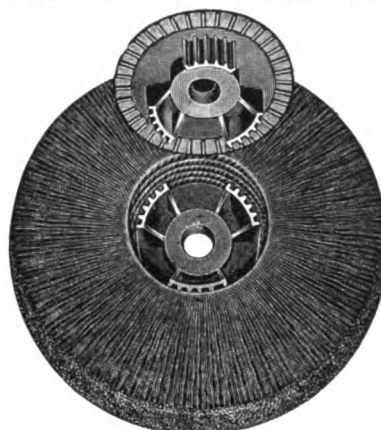
R. T. Guaranteed Inner Tubes equipped with **Newsom Valves** are not only good tubes, but take a place among the best. To live, aggressive dealers we offer an exclusive proposition that is a money-maker and trade builder. Write us.



Fabric Puller

A simplified and practical machine with which the pulling of fabric from old tires becomes an easy operation. Invaluable in tire repair plants that pull their own fabric.

Price, f. o. b. Chicago.....\$25.00



Eclipse Wire Brushes

Made of special wire specially adapted for tire shop use.

Price:
10-in., complete with hub.....\$3.00
10-in., refill only..... 5.20
8-in., complete with hub..... 6.00
8-in., refill only..... 3.60

GARAGE MEN

It's a "Noc-Out." The Hose Clamp sensation. Send for a sample and sell it to yourself.

R. T. Storage Batteries and Battery Service Station Equipment

Battery work—the keystone of a bigger and profitable business.

Install a battery service station and the winter months as well as the summer months will be profitable for you.

Our new catalog, covering our complete line of the latest service station equipment, is ready for distribution and will be mailed upon request. We will also gladly furnish estimates on complete equipment for battery service stations.

To already established service stations we offer our battery, a product upon which we can safely place a two-year guarantee. Our dealers' proposition is a money-maker. If we are not represented in your territory, write us.

R. T. Mfg. & Sales Co.

3847 W. Madison St., CHICAGO, ILL.



1921 Model Fabric Skiver

The money invested in a good fabric skiver is a positive money-making investment. The money invested in a poor one, no matter how small the cost, is a loss. Buy a money maker, the 1921 Model.

Price, f. o. b. Chicago.....\$25.00



FOR AUTO TIRE VALVES

The Snap Lox Dust Cap

Your customers want the "Snap Lox," as it does away with screwing the dust cap off and on every time air is put into a tire. Get our prices.



THE Noc-out HOSE CLAMP IS A 1921 WINNER

Up-to-the-Minute Garage Equipment

Cylinder Easily and Accurately Re-bored with the Storm.

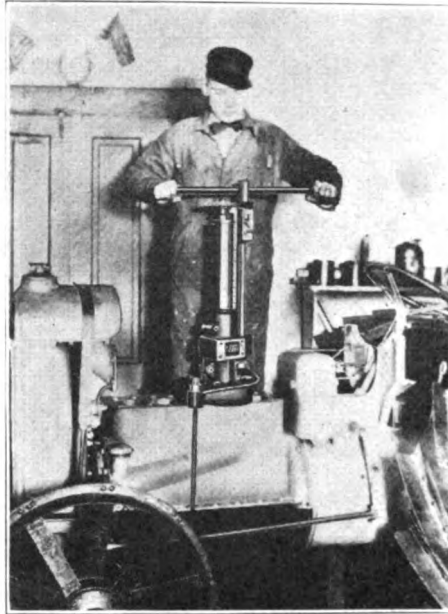
The Storm, type M, re boring machine, which is now being offered to the trade, possesses a number of unique features and advantages, making it admirably adapted to the needs of shops doing cylinder re boring of all kinds.

The main body is a one-piece heavy casting which supports the boring bar, feeding and driving mechanism. The construction provides two heavy, adjustable bearings in which the boring bar operates.

The boring bar is of hollow, carbon steel, hardened and ground and having a travel of 14 inches. It is actuated by means of cut spiral gears and the feed is obtained through a heavy internal screw and upper feed gear, as shown. The bar supports the cutter heads, which are not shown in the illustration. These cutter heads are of the well known Storm patented six-cutter type, which have universal adjustment by means of a center cutter adjuster, so that they may cut to any desired sizes within the capacity of the machine.

The machine is supported by a heavy base, provided with clamp yoke and clamping screws. It floats or rides free in the

clamp and is self-centering. A valuable feature of this tool is that it is adaptable to different methods of drive. It is regularly furnished with connection for drill press drive, but can also be furnished with pulley for belt or for motor drive. It will be noted in the illustration that the machine does not set directly under the drill press spindle but instead sets to one side so that



Easily Operated Separate From Base.

the arm can be easily swung to one side and does not interfere with the use of drill for other work.

Furthermore, it is back-geared so that it may be used in connection with any ordinary 20-inch drill press, whether the latter is back-geared or not. This is said to be an important improvement over machine where the drill press connects directly to the upper end of the boring bar. With these types, a back-geared press only can be used, otherwise the proper slow speed cannot be obtained. Then, too, the height of the machine on the block often makes it impossible to use the machine under drill press.

Each machine is also provided with a double-end wrench for operating by hand, so that the machine may be removed from the base by merely withdrawing two small pins in the clamping device and used, as illustrated, for re boring motors without removing them from the chassis.

One illustration shows a Fordson block being re bored in this manner. Users find this very convenient, not only for tractor but for marine engines, truck and passenger cars.

The total capacity of this machine is from 2½ to 6½ inches, and its weight complete with base is approximately 300 lbs. It

is manufactured by the Storm Mfg. Co., Minneapolis, Minn.

Mention the AMERICAN GARAGE & AUTO DEALER when writing the Storm company for further details.

Satisfactory Shop Equipment Always Means Satisfied Customers.

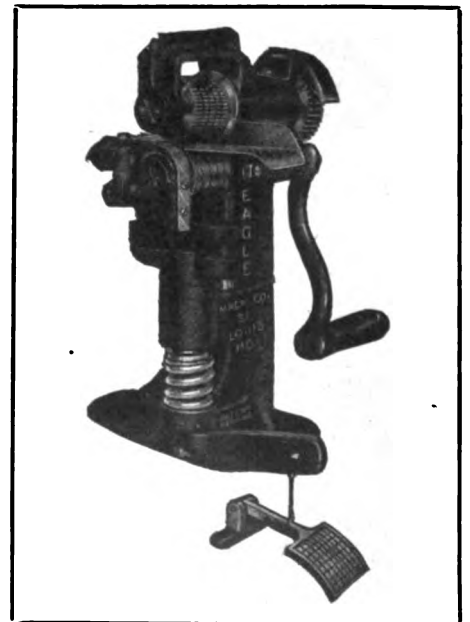
No argument that could be put forth would convince the up-to-the-minute garageman that efficient equipment didn't add to the efficiency of his work. And a no more valuable machine could be added to the shop that would be efficient than the improved wide-blade fabric skiver made by the R. T. Mfg. & Sales Co.

This machine was designed to skive down the plies of pulled tire fabric for reliners and shoes. It is a simplified, practical necessity for any repair shop.

The manufacturer claims that this fabric skiver will do the work neatly in one-tenth of the time that is required if the work is done by hand. And the manufacturer further claims that this is the only machine that will skive two-ply reliners and do it right. It is adjustable to skive up to five-ply.

Another aid to the garageman who would keep his equipment at the top notch of efficiency is the new head cutter which is being put out by the same company.

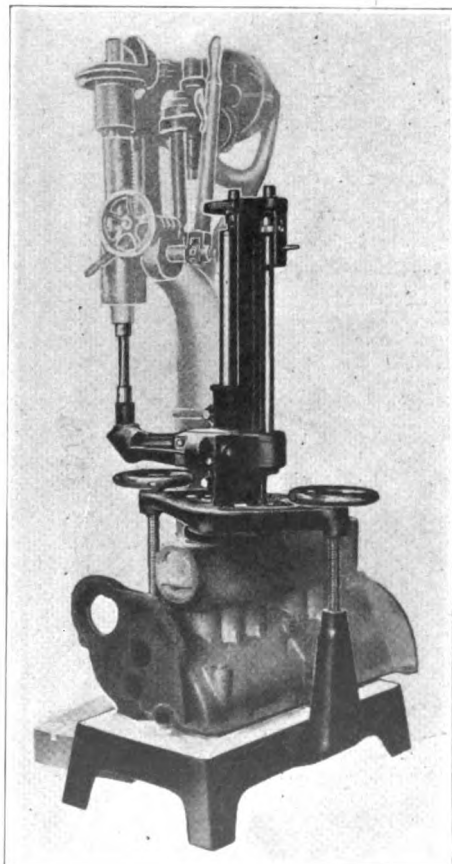
This machine makes an easy job of cut-



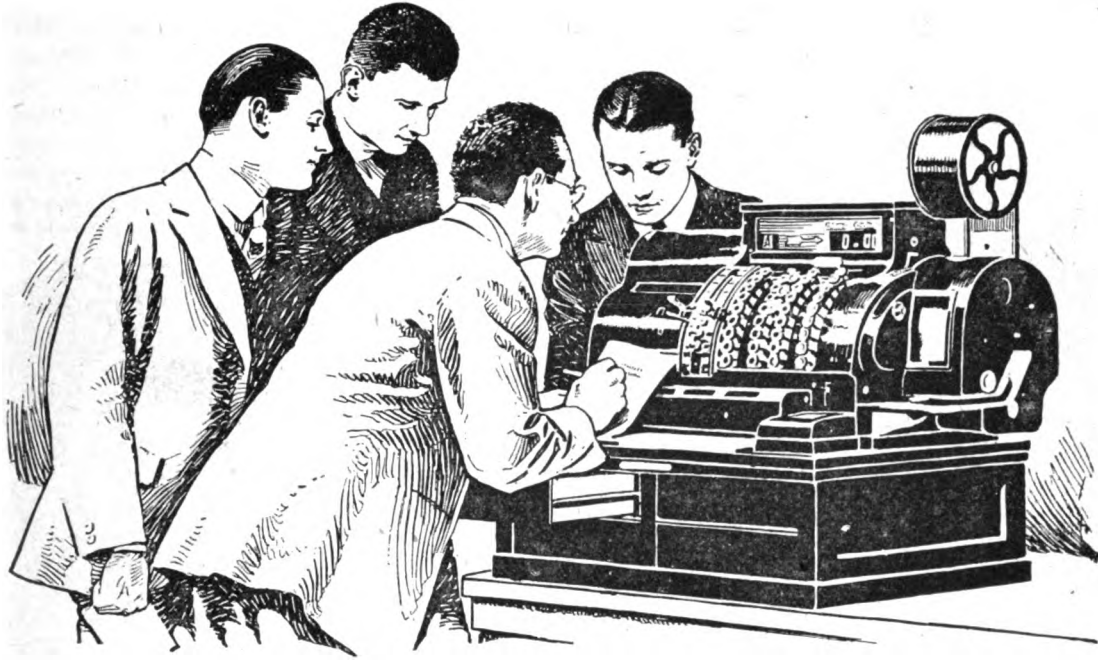
The Skiver Is a Practical Necessity for Any Repair Shop.

ting the head off old tires which are being stripped down for shoes, reliners, or use as tops for double treads.

Its simplicity of construction makes it very easy to operate. The head raises and admits the tire, and the lever, pulled down,



No Interference With Other Drill Work.



The record of each clerk

An up-to-date Cash Register shows you exactly what each one of your clerks does every day. Adding counters on the register tell:

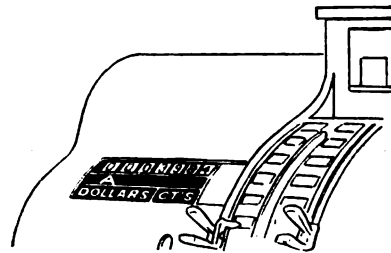
- ① How many customers each clerk waited on.
- ② The total amount of each clerk's sales.

These daily records show you which clerks are most industrious, which clerks sell the most goods, which clerks are most accurate.

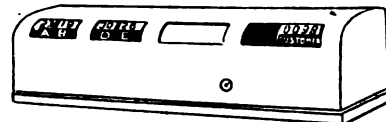
They enable you to fix wages on actual selling ability.

They give you the figures needed for a bonus or profit-sharing system.

These clerks' records, together with the many other printed and added records made by an up-to-date National Cash Register, enable you to control your business.



This adding counter, at the left side of the register, shows that Clerk A took in \$39.84 during the day. Similar counters show what the other clerks took in.



These adding counters, at the front of the register just above the cash drawers, show how many customers each clerk waited on, and the total number of customers.

We make cash registers for every line of business. Priced \$75 and up.

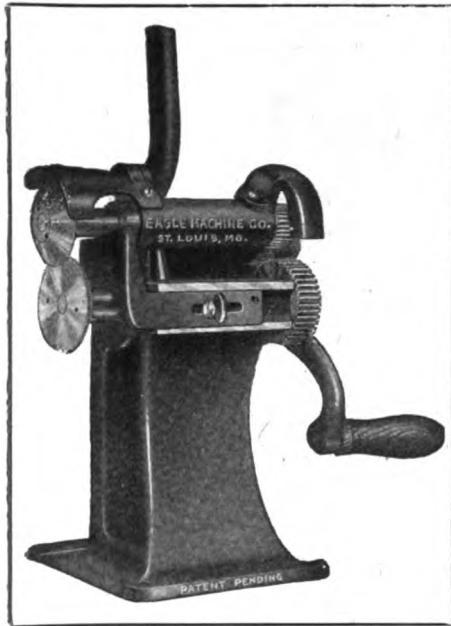
NATIONAL

CASH REGISTER CO.

DAYTON, OHIO.

locks automatically. There are no screws or clamps to be fastened, and the blade is removable and can be renewed.

You will want further particulars, so write to the R. T. Mfg. & Sales Co., 3847 W. Madison St., Chicago. And when you



Machine Which Cuts Bead Off Old Tires.

are writing don't fail to mention the American Garage & Auto Dealer.

Sturdy Tire Rack That Combines Attractiveness and Security.

When purchasing new equipment, the garageman who is a careful and conservative buyer not only takes into consideration his need for an article and its cost,

but he looks about for the equipment that will most satisfactorily meet his demands.

The would-be purchaser of a tire rack will find the Security display tire rack, made by the W. J. Smith Co., a dependable product.

It is made in one size only, but it holds 100 tires, or less, according to the individual requirements of the tireman. The accompanying illustration of the rack shows the details of construction which are simple in every way. There is only one operation required to open or close the rack, which is just to raise the lever arm.

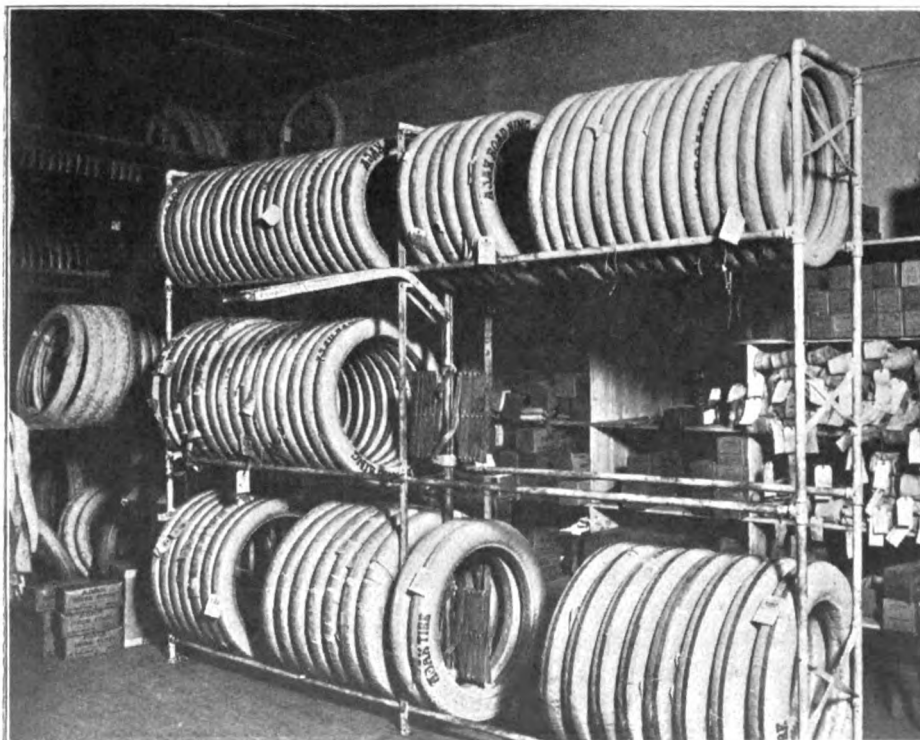
This causes all of the lazy tongs to fold at once. By the way, the lazy tongs are made of flat steel, $1\frac{1}{4}$ ins. by $\frac{1}{4}$ in., and when extended lock into the outside uprights as indicated in the illustration.

When the rack is open, the lever arm is raised 6 ft. 4 ins. above the floor, which is ample clearance. This allows the use of the Security tire rack for display purposes to advantage.

The feature of safety from pilferage and theft of the Security rack is claimed to be ideal from all standpoints. The lever arm contains a Yale lock of three tumblers which locks the arm securely to the frame of the rack, the construction of which is steel. Uprights and cross sections are of pipe, $1\frac{1}{2}$ inches in diameter.

The neatness of the tire rack's appearance, its combined attractiveness and durability and its sturdy construction admirably adapt it to the tireman's use.

Complete details and trade prices will be sent upon request by the W. J. Smith Co., 1834 Broadway, New York City.

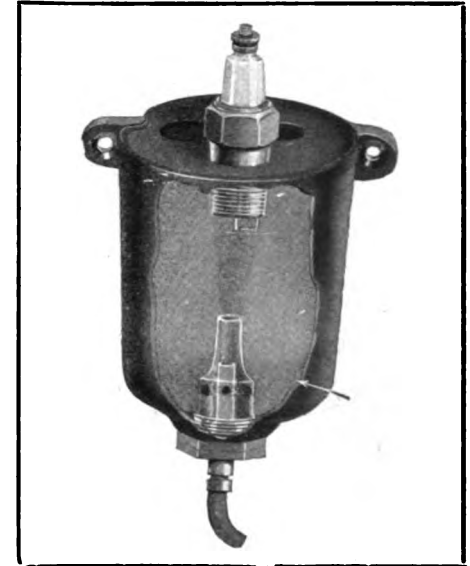


Tires Cannot Be Removed From This Rack Except by Unlocking Yale Lock.

When writing for further particulars, mention the American Garage & Auto Dealer.

"Hury-Kane" Is Its Name; Cyclonic, Its Action

It is undoubtedly true that mechanical equipment is not always utilized to its fullest efficiency. Why not use your compressed



Insures a Perfectly Clean Spark Plug.

air system when cleaning spark-plugs instead of doing all the work by hand?

A spark-plug cleaner is now being marketed by the Brewer Specialty Corp., Chicago, which, when used in conjunction with a compressed air unit, is said to clean perfectly the dirtiest of spark-plugs in five seconds or less.

It is called the "Hury-Kane," which is a very apt name for the tool in view of the speed attributed to it and its method of operation, as well as the claim that absolutely no dirt remains on the foulest spark-plug when this device is used for cleaning.

The operation is simple. The plug is inserted in the opening of the cleaner, the top of which revolves, and is held firmly with one hand while the other hand applies the compressed air nozzle to the stem—just as when a tire is to be filled. Count five, applying the air intermittently as you count, and the fouled plug is said to be like new; further, that it is not only clean on the outside but also on the inside wherever carbon or oil has found a lodging place.

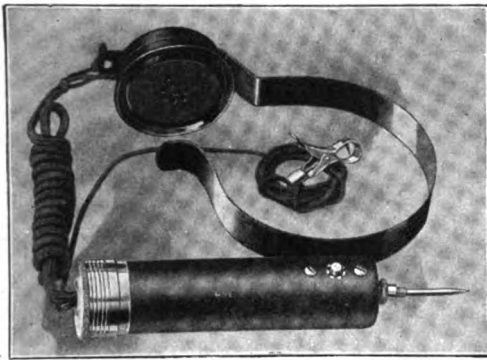
Perfectly cleaned spark-plugs assure smoothly running motors, and smoothly running motors, in turn, mean satisfied customers. It is equally true that satisfied customers assure more business to the garage or shop.

The "Hury-Kane" is constructed to take all sizes of spark-plugs, and certainly will be of interest to garages, service stations, automotive dealers, filling stations, repair shops and factories which have a fleet of trucks.

The Brewer's Specialty Corp., 2453 Wa-

\$6^{.50}

Brings you this dependable Testing Set



The SCOUT

is a simple instrument which will test for shorts, grounds and crosses. It will determine accurately the condition of electric wiring of any kind.

There is no phase of electrical work, manufacture, installation or inspection on which the SCOUT is not a distinct time saver and help.

No Garage man or electrical expert can afford to be without the SCOUT.

It is just the thing for testing Automobile wiring. It greatly simplifies such tests and saves a lot of time and labor.

The SCOUT is entirely self contained and is exceedingly compact and light—can be carried in your coat pocket. The source of testing current is a standard flash light battery placed in the handle.

The results it gives are accurate and dependable.

The SCOUT will substantially increase the profits of your electrical repair department.

Order one today

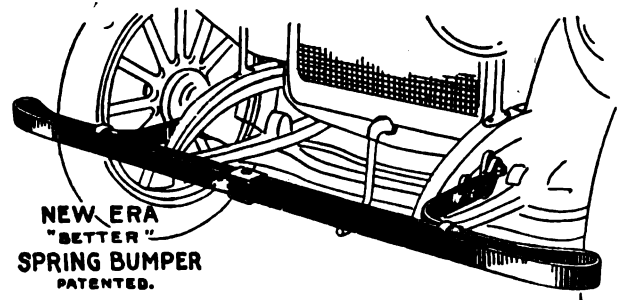
LEICH ELECTRIC CO.

MANUFACTURERS OF RADD SPARK PLUGS

Genoa

Illinois

Double Bars—Double Strength



A GUARANTEE THAT PROTECTS YOU— MINUS THE DETAILS

The strongest possible selling argument which has ever been devised to give help to dealers is the exclusive New Era accident insurance policy delivered with the bumper to each purchaser.

This printed policy says all that you can ever say to prove the superiority of New Eras. Briefly, we make good any damaged bumper regardless of how the damage occurred, whether the driver's fault or not, whether the bumper has been subjected to unusual strain or not. There are no "ifs", "buts", "provided's."

The accident guarantee does not take up any of the dealer's time, cause him any trouble. The policy instructs the purchaser to return the damaged bumper direct to the factory and receive a new one in exchange. The accident insurance, a proved sale maker, is just one of the reasons for the tremendous growth in our business, just one of the many strong points in the most complete bumper line on the market, the most popular line with car owners and the trade, the one line where there is never any dead stock, because of the free exchange of arms, always a quick turnover, always an easily earned profit.

Fords—fronts, (black), \$10.50; nickel \$12.00.

Rears, (black) \$12.50; nickel, \$14.00.

All other cars—(black), \$13.50; nickel, \$15.00.

Write for catalog on "better" springs, tire carriers and spring bumpers.

New Era Spring & Specialty Co.

56 Cottage Grove Avenue
Grand Rapids, Mich.

NEW ERA "Better" SPRING BUMPERS

bash Ave., Chicago, which manufactures this spark plug cleaner, will gladly supply any further details desired upon request. Be sure to mention the American Garage & Auto Dealer when writing.

The Story of the HB 10 Battery Charger Will Interest You.

There are two big, outstanding facts about the battery-charging business today, says Hobart Brothers Co.

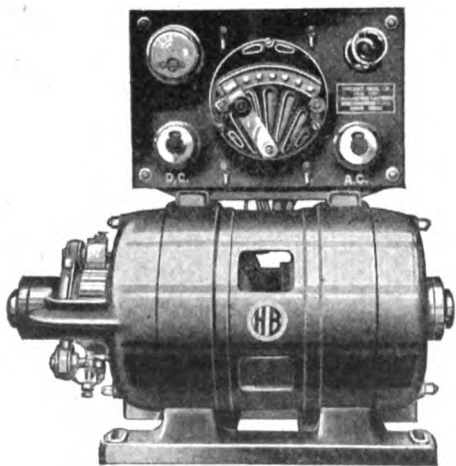
First—It is profitable, bringing quick returns on the money invested, when the proper equipment is used.

Second—It is a business that is growing by leaps and bounds.

To hold the customers' trade, dependable charging service must be furnished. The HB 10 battery charger that the Hobart organization is placing on the market is a full 600-watt equipment, with an efficiency that is said to guarantee quick, dependable charging and big profits.

This outfit is self-starting, operating on alternating or high-voltage direct current. A special automatic universal voltage control is an exclusive feature which makes it possible to recharge any automobile storage battery quickly, successfully and profitably. It will automatically handle 6, 12 or 24-volt batteries at the same time.

The charger is very compact with a height of 26 inches; length 27 inches, and weight of 280 pounds. Its capacity is 10 amperes, 6-70 volts, varied by the number of batteries on charge. The switchboard is of clear electrical slate, with mountings of ammeter, field rheostat, voltage lamp and two controlling switches. The wear-proof ball bearings require lubrication only once in three or four months. Large commutat-



The H B Battery Charger Is Most Compact.

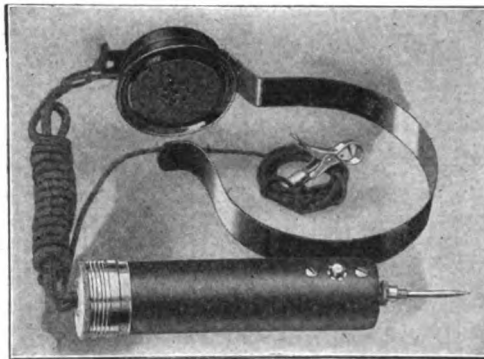
ing surface and low operating speed insure dependable and profitable service.

"If you choose an HB battery charger, you will get the benefit of 26 years' experience in building electrical equipment," says the manufacturer. Write for trade prices and additional information, to Hobart Brothers Co., Troy, Ohio. Mention the American Garage & Auto Dealer when writing for further particulars.

Trouble Finding Made Easy With the Scout.

"He's a good scout!" We often make that remark concerning some friend of whom we think as being particularly reliable. Here is another "good scout" to be added to the ranks of tried and true friends.

The Scout trouble-shooter, according to its manufacturer, is an invaluable assistant in locating trouble wherever electrical circuits are employed. Originally designed for testing telephone wiring, it has been found



The Scout Is An Efficient Trouble Finder.

equally successful for testing automobile wiring, motor and generator armatures, house wiring, switches, meters and electrical appliances of all kinds.

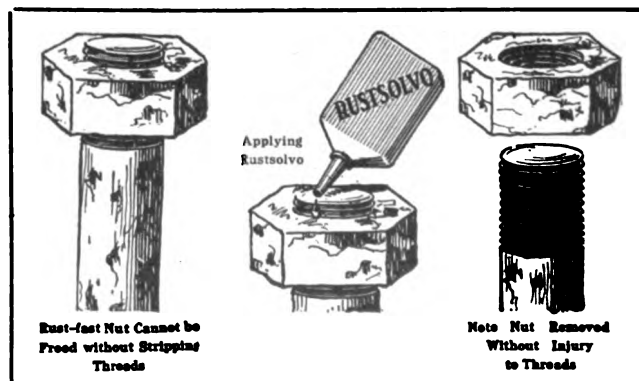
The Scout consists of one single unit which is said to embody all the features necessary for the rapid testing of electrical circuits and accurate location of faults, such as short-circuits, grounds and crosses.

The essential parts of the scout are a sensitive telephone receiver and a flashlight battery. These two units are arranged to be connected in series by means of a push button switch located in the hollow fibre tube in which the battery is also placed. The Scout, complete, weighs only 10½ ounces.

When making a test, the circuit is completed through the exploring point attached to one end of the tube, the wiring to be tested, the snap clip and the head receiver. A continuous circuit is indicated by the click in the receiver. No signal is obtained if the circuit is open.

The flashlight battery used for furnishing the testing current is of standard size and can be secured, whenever renewal is necessary, of any druggist or, electrical dealer.

Rustsolvo Has Many Uses in the Garage and Repair Shop.



It is being offered at an exceptionally low price. Write the Leich Electric Co., Genoa, Ill., for details, and be sure to mention the American Garage & Auto Dealer.

Rusts the Enemy of Automobile and Truck Repairmen.

Rust, that enemy of nuts, bolts, pins, threads and other parts, the cause of extra work for the repairman, swiftly melts away, so it is stated, when Rustsolvo, a labor-saver made by the Rust Products Co., makes its appearance. for Rustsolvo is a free-flowing, harmless, non-inflammable fluid that not only softens rust, but red or white lead, paint, tar, grease or dirt. That it cuts any deposit of carbon, graphite, shellac or green corrosion of batteries without injury to the metal, rubber or wood, is no other feature set forth by the manufacturer.

Rustsolvo, it is claimed, is a Godsend to the man lying on his back beneath a car. There is no more need to strain and tug or finally resort to breaking a part in order to get it out. A squirt or two from the handy Rustsolvo can—and, presto! It may almost be taken apart with the fingers.

The saving in work is said to be enormous. One man with Rustsolvo is said to do quadruple the work in taking down the average machine.

Among the parts which an application of Rustsolvo will effectually deal with are bearings on armature shafts, valve cages, spark plugs, shackle bolts and nuts, spindle bolts, and innumerable other places. The occasional application of Rustsolvo between spring leaves, especially in the rear axle of trucks, preserves resiliency and saves many renewals.

Of course, it is impossible to enumerate all of the uses to which Rustsolvo can be put, but this will give you an idea. Get it?

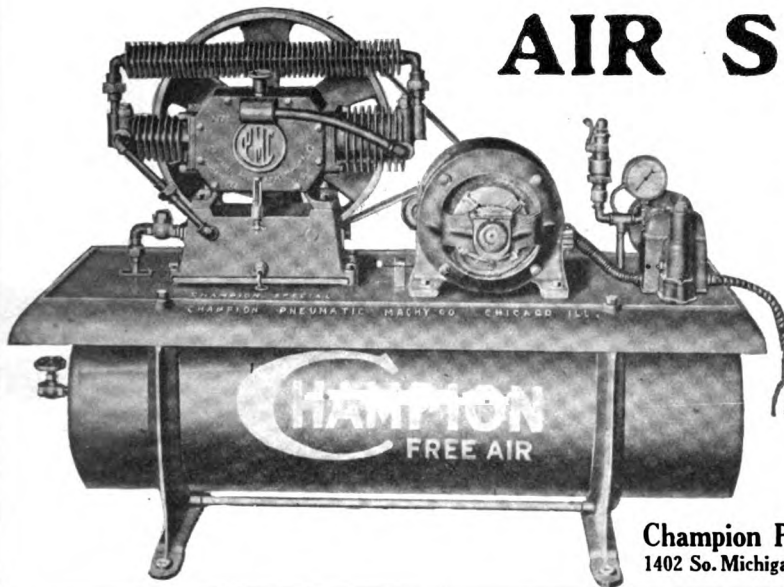
Each drop of Rustsolvo saves something in money, time, labor and material. Write to the Rust Products Co., 64 East Lake street, Chicago, for further particulars, and when writing don't forget to mention this magazine.

New and Valuable Service Manuals for Service Stations.

Service stations and repairshops are oftentimes handicapped in making repairs

Business is always good
for the garage that gives

CHAMPION AIR SERVICE



Motorists and truck drivers invariably stop for air at the place where they know they can get quick and dependable service. And for gas, oil and supplies they naturally go to the same place.

The Champion Air and Water Stand

is the latest and most satisfactory means of supplying free air. Handsome, attractive, automatic and positive in action. No accidents—when hose is released it returns *gradually* to its normal vertical position. CHAMPION AIR COMPRESSORS combine incomparable service with extremely low upkeep cost. Made in many types for every need.

WRITE FOR OUR LITERATURE. Dept. A.

Champion Pneumatic Machinery Co.
1402 So. Michigan Ave. CHICAGO



Our Bearing and Lubricating Experts Are at Your Service

to assist you in any bearing troubles. Ship us one by parcels post—one of your own bushings—and we will treat it and return it next day without cost to you. Test it on your own work. We guarantee a saving of 80% to 90% in your lubricating oils on any service.

Designing
Developing
Detailing **OF**
Delivery

Experimental Work and Models for inventors and others.
Air and Ammonia Compressors, Tractors and Accessories, Automotive Trucks, Power Transmission, Clutches and Gearing.

Internal Combustion Engines for any fuel from crude oil to gasoline, either two-cycle or four-cycle, and for any purpose from farm to airplane engines.

Filtering Systems for lubricating oils or gasoline piping.

Labor saving devices.

Concrete Tanks for any liquid.

Water System and Power. Manufacturing.

NOW IS THE TIME

to fix up your old engine

We specialize on engine work, particularly two-cycle marine, while laid up for the season

Peerless Engineering Co.

EXPERT ENGINEERS

Lock Box 1472

Cincinnati, Ohio

and adjustments by a lack of complete and authoritative information on the internal wiring of the various starting and lighting systems.

After six years of careful study and investigation by its engineers, the American Bureau of Engineering, Inc., has been able to gather together and publish in plain, non-technical language, complete information on the internal connections and construction of the various starting and lighting systems.

Not even the manufacturers own manuals will give as much information as do Ambu service manuals, according to American Bureau of Engineering. The diagrams have been drawn by Ambu engineers and

draftsmen. The information is classified, indexed and cross indexed, so that the data wanted can be immediately found.

These manuals cover every generator and motor which has ever been used on American made automobiles, trucks, tractors, and motorcycles. The manuals contain the following information:

Internal wiring diagrams; complete description of details of construction, design, and operation of any starting motor, generator, voltage regulator, current regulator, cutout starting switches; data on generator outputs at various speeds and voltages; data on starting motor torque, speed and current consumptions; instructions for setting voltage regulators, etc.

Five manuals are now ready and others will soon be off the press—Autolite, Gray & Davis, Remy, Delco, and Westinghouse.

For more complete details, write to the American Bureau of Engineering, 1601-03 S. Michigan Ave., Chicago. When you are writing, don't fail to mention the American Garage & Auto Dealer.

Paragraph.

THE FAIRBANKS Co., New York City, has announced the appointment of E. J. Krause, Jr., as manager of its service station equipment division. Mr. Krause is well known in automotive circles in the Middle West. He was general manager of the Service Station Equipment Co. in St. Louis.

Auto Repairing Profits

The profits of the repair shop depends to a large extent on the tools and equipment you have to work with.

Write today for our catalog covering

Torit Oxy-Acetylene Torches

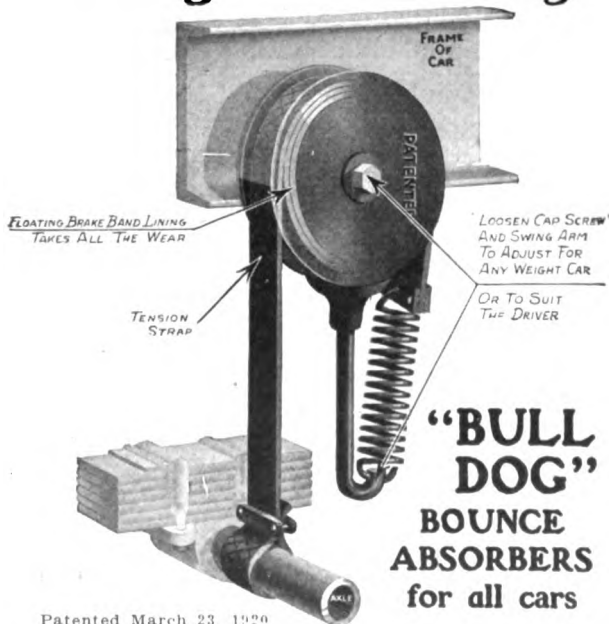
for soldering, brazing, battery work, radiator work, carbon burning, welding, etc.

ST. PAUL WELDING & MFG. CO.

174 W. 3rd Street

ST. PAUL, MINN.

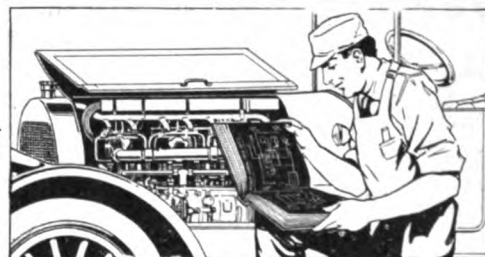
**No more broken springs
Better tire service
More gasoline mileage**



Patented March 23, 1920

relieve the strain that break springs and wear out tires. Can be adjusted to fit any car. Made for both front and rear springs. DEALERS—Get data and trade prices.

CHANNON-HUGHSON CO., 229-233 W. Erie St. Chicago, Ill.



Is A Wiring Job A Guessing Contest?

NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and strangers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car or truck since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

The profits on the first half dozen jobs the Manual shows you how to do are more than enough to pay for it. The rest of its big dividends are velvet. And the price is only fifteen dollars, delivered anywhere. Put a check in an envelope and start it to us right now.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.

41 E. 29th St., New York

Suite 924, No. 18 Tremont St., BOSTON, MASS.

N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.

London, England. Motor Technique Bureau, 149 Strand, W. C. 2

Sat's-
faction
Giver



Showing Shade
with Top Up—

Showing Shade
with Car Top Down—

LOUDON

ADJUSTABLE

Storm & Sun Shade

A quick selling Ford accessory—and built particularly for that car. Designed to quickly attach and operate without interfering with closing or opening of windshield. Also permits lowering of touring top without removing shade—a unique and exclusive Loudon sales feature. Projects ten inches in front, protecting driver from sun glare, and rain or snow clouded windshield. A safety-first and driving comfort device. Made of steel and high grade rubberized top material.

Easy to Attach— Simple to Adjust

The Ford windshield is not constructed with sub-frame, hence few shades can be attached if windshield is to be operated—opened or closed—or car top lowered.

The Loudon adjustable Storm and Sun Shade interferes in no way with operation of any part of the car. It is a simple task to attach it and it may be adjusted to any desired angle by a touch of the hand.

For Fords Only— Nationally Advertised

Loudon adjustable Storm and Sun Shade is made for the Ford exclusively. There is a ready demand and the big selling season is now here. Dealers are urged to write for prices and literature. Extensive national advertising campaign will move the stock and the profit is generous. Quick selling, dependable merchandise, that will serve and satisfy. Write us. Address Desk A.

Big
Demand

Monthly
Turn
Over

Small
Investment

Loudon-Incorporated

Manufacturers-Distributors
Automotive Specialties

107 Western Avenue - Minneapolis, Minn.

Liberal
Profits

Quick
Seller

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



BUTTERFIELD & CO.
COMBINED AUTO SCREW PLATE
1/4 5/16 3/8 7/16 1/2 5/8 3/4 S.A.E.
1/4 5/16 3/8 7/16 1/2 5/8 3/4 U.S.S.
WITH TAP WRENCH NO. 10.

Set shown in illustration enjoys a well deserved popularity in the automotive field. Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each. Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

Valve Grinding that Pays

is the kind that is done perfectly with a minimum expenditure of time and labor. For such results use an

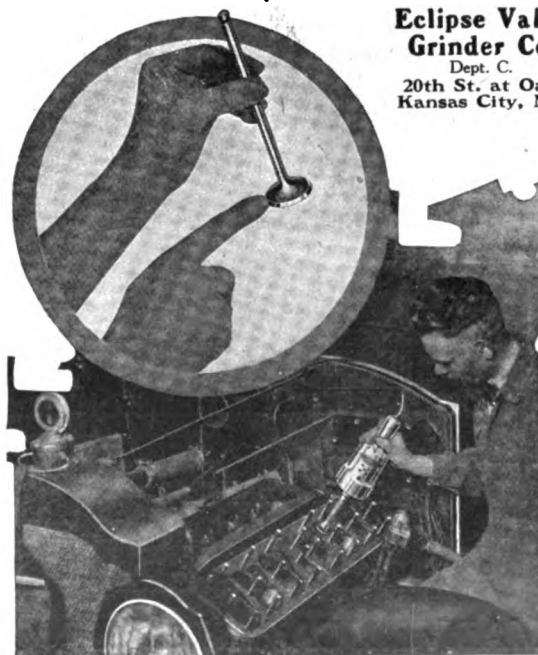
ECLIPSE ELECTRIC VALVE GRINDER

It requires only a minute and both valve face and seat are smoothed to a clean, hard, gas-tight finish. This light, portable power driven tool is a big profit maker.

Write for data

Eclipse Valve
Grinder Co.

Dept. C.
20th St. at Oak
Kansas City, Mo.



FINCK'S

DETROIT SPECIAL
OVERALLS & COMBINATION SUITS

Extra Wear
in
Every Pair

The materials that go into Finck Overalls and Combination Suits, together with the skilled workmanship and the careful design of the garments, all tend to make them wear long after the ordinary ones have found their way to the rag bag.

At your dealer's or write us.

W. M. FINCK & CO.

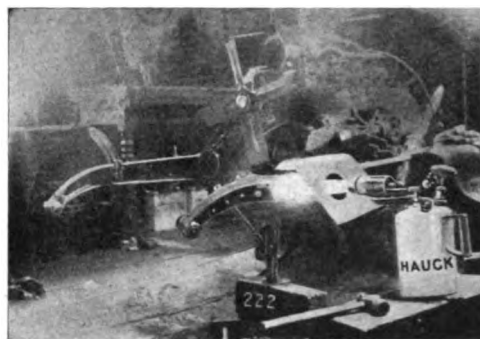
Detroit, Michigan

Manufacturers of High Grade Overalls,
Men's and Women's Combination
Work Suits

BRANCHES

St. Louis, Mo. Dallas, Texas
Seattle, Wash. Chattanooga, Tenn.
Livingston, Mont.

(76)



Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

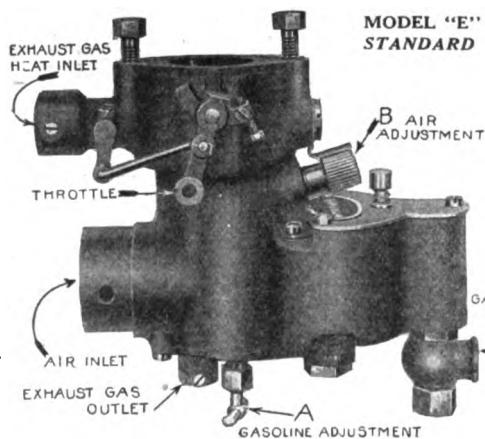
A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.

Salesman or Sales Manager

WHETHER you are a salesman or a sales manager, a general manager, an officer or a director of your company, you should be represented by a good card—**THE BEST CARD.**

**Peerless Patent
Book Form
Card**



Appearance of our neat card in case

That they are the best, admits of no discussion. The best men everywhere use them. If you don't it is only because you have not examined them. They are always carried together and they carry conviction. They are always smooth edged when you detach them, and they are always clean and flat. They leave nothing to be desired, however fastidious the taste, or severely critical the judgment.

Send today for sample tab and detach the cards one by one—satisfy yourself as to what others universally call best. Send today.

John B. Wiggins Co.

Engravers, Die Embossers, Plate Printers

122 So. Michigan Ave., 1104 So. Wabash Ave.
CHICAGO

EVENTUALLY!



It will be but a short time till a Romort Air and Water Station will be installed in connection with every establishment selling gasoline and oil.

Delays Are Costly

While you wait your competitor who beat you to it is getting your old trade as well as the new, through Romort service that enables the motorist to fill his tires and radiator with clean air and water and clean equipment.

You are losing business and money by delay. Install a Romort Air and Water Station now. It is an investment that brings big returns and advertises your business.

Model S-B With Electric Light

Equipped with continuous air hose, latest improved ROMORT Automatic Air Valves, Water Valves and Universal Hose Coupling.

Height, base to head, 6 ft. Height to top of arm, 12 ft. Radius of hose, 17½ ft.

There are four other models for curb wall and ceiling. Write our sales department for descriptive circular.

Manufacturers
The Romort Mfg. Co.
Oakfield, Wis.

SALES DEPT.
The Zinke Co.
1323 Michigan Avenue
Chicago, Ill.

Made by the makers of the famous Romort Air Products

WHY DELAY?

Handle Grease Easily — Swiftly — Cleanly with an O'BRIEN Heavy Duty Grease Pump

The easiest and quickest operating grease Pump on the market.

Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil. Capacity 125 pounds or 15½ gallons oil.

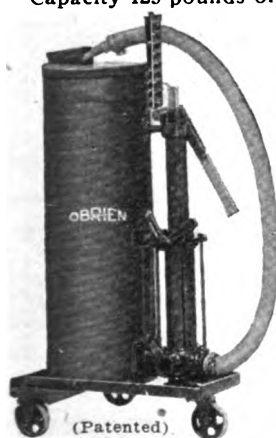
Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

IT DOES YOUR DIRTY WORK

Ask your jobber about them or write us for complete information.

The Grease Pump Mfg. Co.
1500 Michigan Blvd.
Chicago, Ill.



(Patented)

CLARK'S UNITY TRADE MARK MOVE THOSE USED CARS NOW

FOR NOW IS THE TIME AND YOU'VE GOT TO GET BUSY

"UNITY" SIGNS

not only do this, but they modernize the appearance of your show room.

A changeable sign—strong white on black (quick changing) that graces the magnificent show rooms of the Metropolitan Auto Rows will brighten up and put life into YOUR place too.

UNITY SIGNS sell your used cars for you—they bring you new customers from off the street.

UNITY SIGNS are all metal and come in many sizes and styles at prices within reach of all.

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\$100 TO \$200 ON
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ALL IN GOOD CONDITION

MODEL H520

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APPLIED TO AUTO DEALERS

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GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company
1002 Washington Boulevard
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There Is Money in CRANKSHAFT WORK

PROOF

(Are you interested in Profits
and satisfied customers?)

with
the
**WEBER
TOOL**

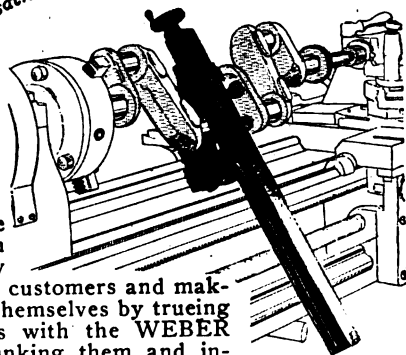
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THIS BOOK~**
It will tell you.

How garages, machine shops and repairmen all over the country are saving money for customers and making more money for themselves by trueing up worn crankshafts with the **WEBER TOOL** instead of junking them and installing new ones.

With one setting of the crankshaft on centers' you can turn all crank-pins with the **WEBER TOOL** absolutely round and straight to factory standards, spending not more than ten to twenty minutes per pin.

At your jobber or write direct.

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Pat. 3-19-'18.

Spark Plug Troubles Are Rare Occurrences on the car equipped with **UNIVERSAL SPARK PLUG INTENSIFIERS**

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken, or a plug fouled with grease or carbon. These **INTENSIFIERS** will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBERs and DEALERs—Your profit is liberal

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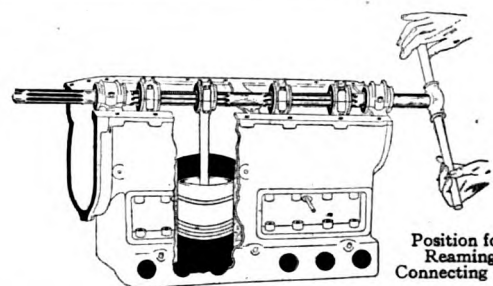


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For handling grease conveniently, quickly, without mess or waste, there is no equal to the **Rose Fil-A-Gun Grease Bucket**. Pumps grease through hose direct to point where needed. Or, one stroke of pump fills the **Rose Taper Nozzle Grease Gun** with which every **Rose Grease Bucket** is equipped.

DEALERS: **Rose Grease Buckets**, like **Rose Tire Pumps**, will increase your sales and make you good profits. Have your jobber send you complete information.

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Connecting Rods

The LEWIS REAMER Multiplies Profits

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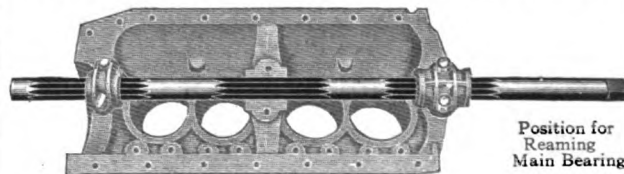
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Ask your jobber or write us today for particulars.

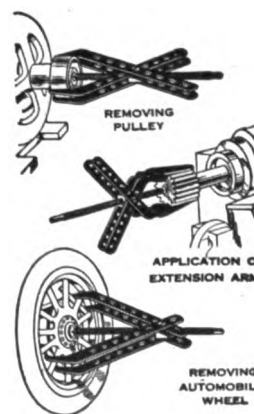
LEWIS TOOL COMPANY

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Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

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furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

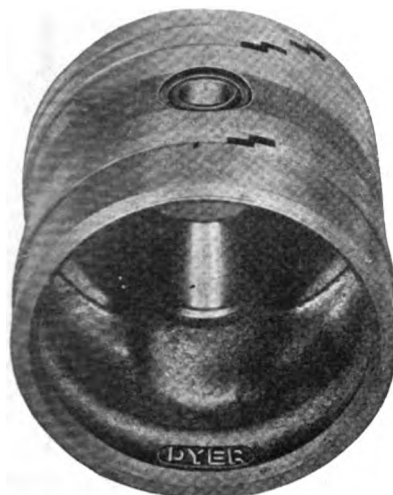
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Finished—Semi-Finished



All Makes and Models of Pleasure Cars, Trucks, Tractors

Automotive and hardware jobbers buy Dyer Pistons because their dealers demand the best. Finished pistons include bushings if so designed. Semi-finished pistons have center grooves standard diameter and pin holes rough reamed with center marks.

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Each Dyer piston is individually packed and marked. Standard and .0025, .005, .010, .015, .020, .025, .031, .035, .040, .045 over-size. Semi-finished Pistons are .062 and Pins .020 over-size.

All Models—All Sizes

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This Wonderful Device

ALSOP-ALL-SPARK

Makes money for you and saves many dollars for the car owner



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This simple, little device does away with Spark Plug and Carbon Troubles, pays its owner big dividends. Ask for copy of report showing severe U. S. Government tests.

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Send for Attractive Window Displays

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Air! the life of the tire depends on it

Do not be afraid to press
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**SCHRADER UNIVERSAL
TIRE PRESSURE GAUGE**
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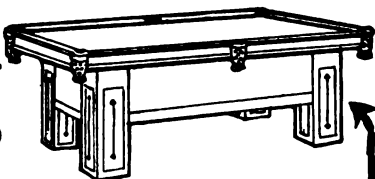
He will thank you for it
after he discovers the
saving in both tires and
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Price \$1.50

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AMERICAN ADJUSTABLE VALVE TOOLS

With these tools anyone can true to a perfect point of accuracy, any angle or degree—and size valve and seat 1" to 3" inclusive.

OVER 30,000 IN USE

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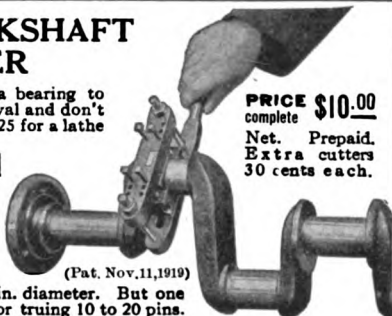
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Don't attempt to scrape a bearing to crank pin that has worn oval and don't pay a machine shop \$15 or \$25 for a lathe job. Use an

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It will true up a crankshaft to less than one-thousandth of an inch in less than one hour without removing shaft from crank case. Adjustable to all crank pins from 1 1/4 to 2 1/2 in. diameter. But one tool needed, cutters good for truing 10 to 20 pins. 5,000 in use. Atlas Special Tool, 2 to 4 in. capacity, \$25.00.



PRICE \$10.00
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Net. Prepaid.
Extra cutters
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A machine for testing and straightening crankshafts, and gear press with housing assembly and piston vice attachments.

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It will introduce to you a complete line of automobile repair equipment, tested and used by leading Service Stations and backed by the "Fairbanks O.K." Sold by Fairbanks branch house and leading jobbers.

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Price \$2.75

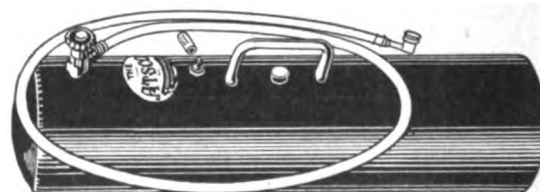
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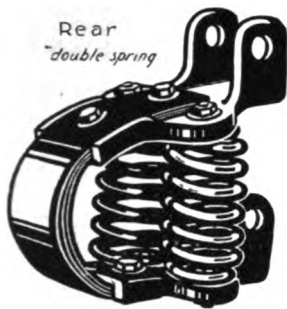
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The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

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\$25.00 Set of **\$25.00**
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For Quick and Sure Results
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Makes Tires and Tubes at
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New		Tube
30x3	\$7.75	\$1.50
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**Aluminite Pistons and Con-
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put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

**Power Plus Cylinder Head
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keeps the motor cool, increases power and speed.

**Expert Motor Building and
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Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

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Standard and Oversize

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**
Goes a **GUARANTEE**
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We Carry a Large Stock for Service

Prompt Delivery on Quantity Orders

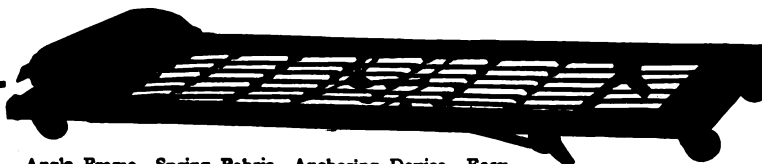
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Piston

Standard—.003 o. s.

**Pins**

.005 and .010 o. s.

We can supply piston pins for all popular makes of passenger cars and for trucks with Continental Motors. Standard, .003, .005, and .010 oversize carried in stock. Jobbers and branches listed below can fill any orders from stock on 24 hours' notice, or you can order direct from the factory. Orders sent by telegraph receive prompt attention. Send for our latest specification chart containing complete data for ordering a new stock of piston pins.

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WRENCHES

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Index to Advertisements

A		K	
Accurate System & Manifold- ing Co., Inc.	—	Kastens, Henry	—
Air-Tight Steel Tank Co.	56	Kennedy Car Liner & Bag Co.	54
Albertus & Co., F. A.	61	L	
All-Spark Ignition Co.	55	Laminated Shim Co.	—
All-Spring Shock Absorber Mfg. Co.	57	Leich Electric Co.	47
American Bolt & Screw Case Co.	—	Lewis Tool Co.	54
American Valve Tool Mfg. Co.	56	Loudon, Inc.	51
Am-pe-co Sales Co.	57	Lourie Mfg. Co.	—
Apco Mfg. Co., The	57	M	
Atlas Auto Supply Co.	8	McDaniel Rubber Co., Leo	—
Atlas Mfg. Co.	56	Marvel Carburetor Co.	52
Automotive Publ. Co.	50	Marvel Machinery Co.	3
		Motor Salvage Co.	58
B		N	
Bailey Co., Geo. D.	31	National Cash Register Co.	45
Beck & Corbitt	57	National Refining Co.	—
Boddy J. Newton	55	National Rubber Filler Co.	—
Brewer Specialty Corp.	4	New England Mills Co.	—
Brunner Mfg. Co.	62	New Era Spring & Specialty Co.	47
Burd High Compression Ring Co.	57	P	
Burgess-Norton Mfg. Co.	59	Paro, H. G., Co.	—
Butler Mfg. Co.	58	Parts Service Co.	—
Butterfield & Co.	51	Peerless Engineering Co.	49
		Peerless Finishing Co.	57
C		Phillips, H. E., & Co.	—
Catelain, Andre G.	58	Pick & Co., Albert	56
Champion Pneumatic Machin- ery Co.	49	Premier Electric Co.	54
Channon-Hughson Co.	50	R	
Clark Co., W. L.	53	Reynolds Spring Co.	56
Colfield Tire Protector Co.	—	Romort Mfg. Co.	53
Curtis Pneumatic Machinery Co.	33	Rose Mfg. Co., Frank	54
		R. T. Mfg. & Sales Co.	43
D		S	
Davies-Young Soap Co.	—	Shaler Co., C. A.	Front Cover
Dickerson, C. A.	37	St. Paul Welding & Mfg. Co.	50
Duntley, J. W.	—	Sawyer-Weber Tool Mfg. Co.	54
Dunton Co., The M. W.	—	Schrader's Son, Inc., A.	55
	Back Cover	Slipson Co., The	6
Dyer Co., The	56	Smith Co., The W. J.	—
		States Chemical Co.	—
E		Stiles Mfg. Co.	—
Eclipse Valve Grinder Co.	51	Storm Mfg. Co.	57
		Sunderland Machinery & Sup- ply Co.	58
F		T	
Fairbanks Co.	56	Tokheim Oil Tank & Pump Co.	—
Federal Electric Co.	39	Trindl Co., The	58
Finck & Co., W. M.	52	Tungsten Mfg. Co.	61
Flexlume Sign Co.	33	U	
Foster Bros. Mfg. Co.	59	U. S. Air Compressor Co.	—
		Universal Mfg. & Sales Co.	54
G		V	
Ganschow Co., William	53	Victory Oil Stove Co.	—
Garden City Spring Works	61	W	
Gem Novelty Co.	57	Wagner Specialty Co.	58
General Utility Co.	7	Warshawsky & Co.	58
Globe Mfg. Co.	5	Washburn Burner Corp.	—
Graham Roller Bearing Co., The	56	Webber & Co., P. H.	6
Grease Pump Mfg. Co., The	53	Wiggins Co., The John B.	52
Green Engineering Co.	58	Worcester Abrasive Co.	41
Greer College of Motoring	58	Z	
H		Zinke Co.	53 and 56
Harvey Spring & Forging Co.	61		
Hauck Mfg. Co.	52		
Helser Special Tool Co.	—		
Hicken Sod-Tor-Lite Co., B. E.	54		
Hobart Bros. Co.	56		
J			
Jenkins Vulcan Spring Co.	35		

Harvey
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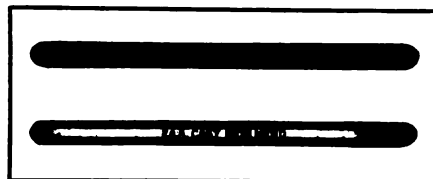
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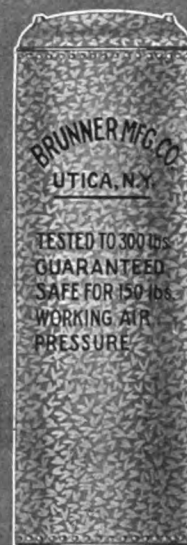
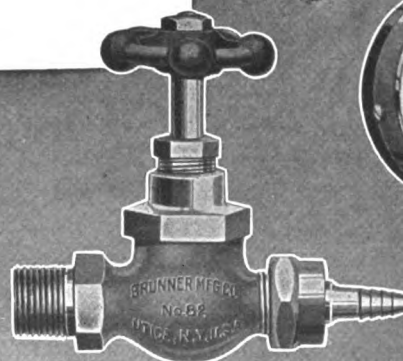
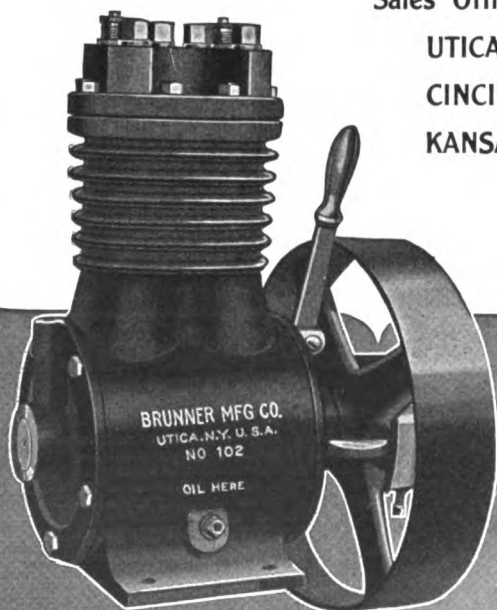
Works: Utica, N. Y.

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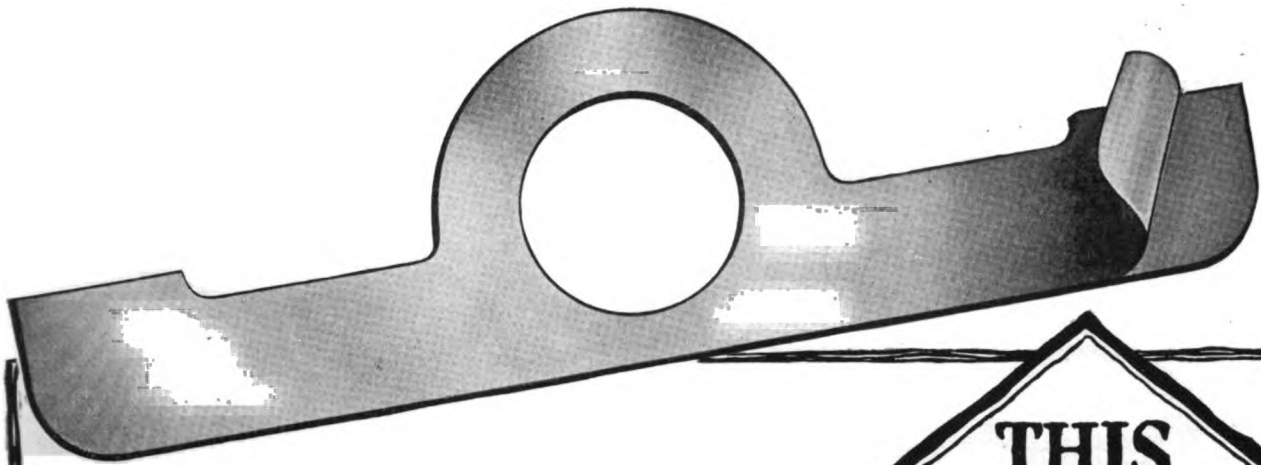
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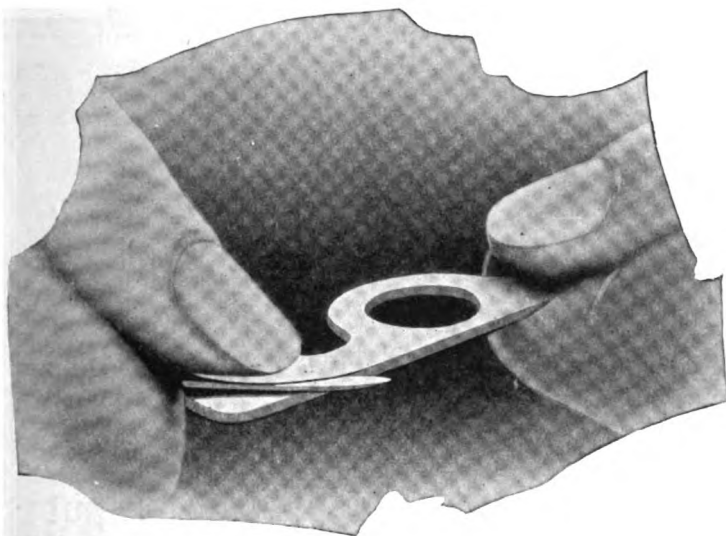
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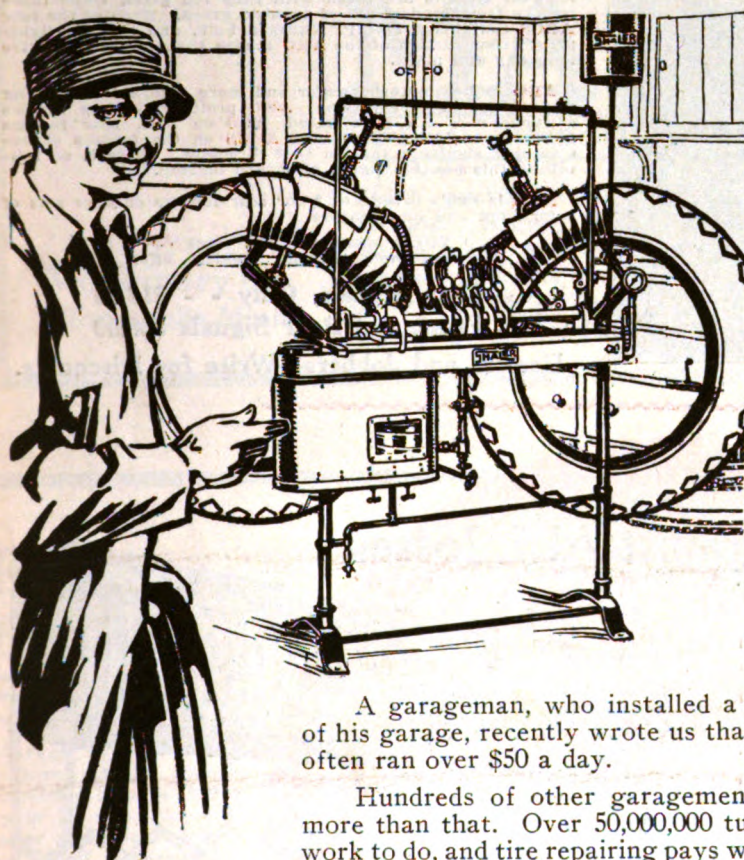
THE M. W. DUNTON COMPANY
PROVIDENCE, R. I., U. S. A.

American Garage & Auto Dealer

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CHICAGO, ILL.

APRIL, 1921

Vol. 12—No. 4.
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\$1.00 Per Year.



**How He
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\$50 a Day
in a Corner
of his Garage**

A garageman, who installed a SHALER Vulcanizing Plant in a vacant corner of his garage, recently wrote us that the first day he made \$45 and that his profits often ran over \$50 a day.

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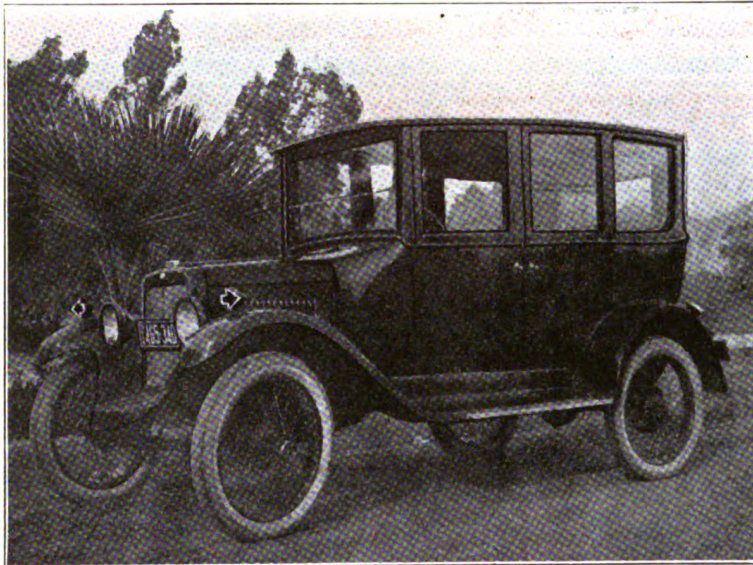
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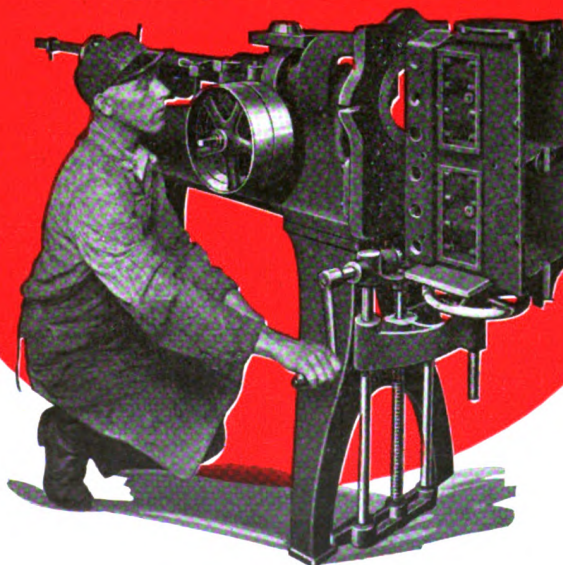
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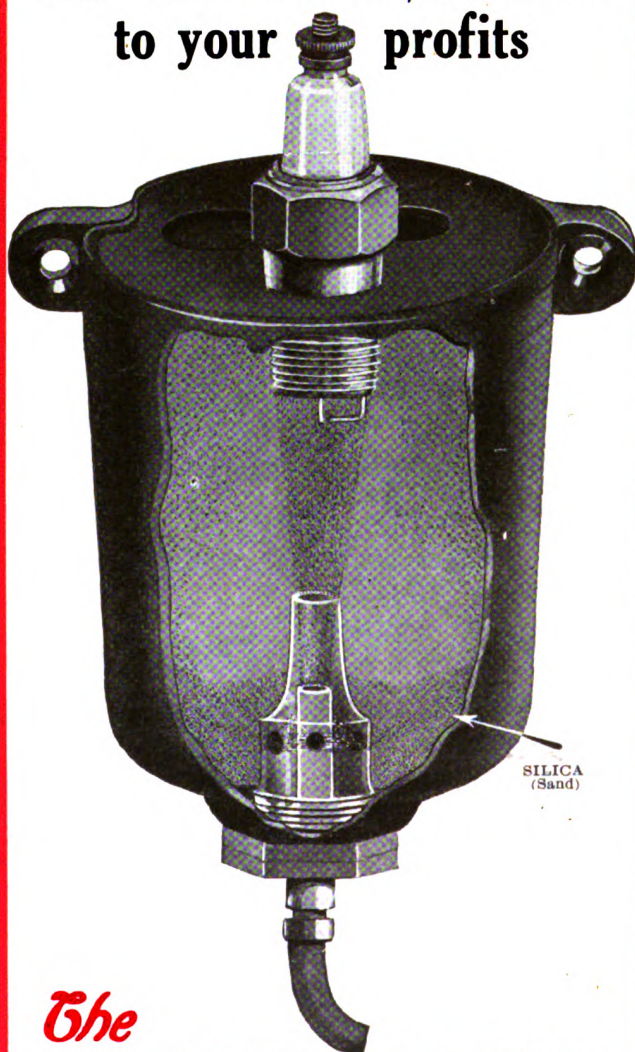
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2453 So. Wabash Ave., Chicago, Ill.

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Build Highways This Year.....	9
Renewed Activity in Industry.....	9
Don't Overlook a Prospect.....	10
First Sale Never Pays Its Expense.....	10

GENERAL

Counteract "Dull Period" Resistance, by K. H. Lansing	11-12-13
The Spirit That Wins—"Be a Booster," by Earl Bullock	13-14
A Word to the Wise—"You Tell 'Em!" by Fred Counterman	15
You Can't Judge a Man by His Cloze, by Frank Farrington	16-17
Cartoon	19
Who Is Liable for Defective Tools, by Chesla C. Sherlock	20
Legal Rulings of Interest to Garagemen, by R. R. Rossing	23
Glimpses in the Garageman's World.....	24
Did You Ever Try Growing Pistons? by J. N. Bagley	25-26

DEPARTMENTS

Accounting, by J. N. Boddy.....	17-18
Welding, Cutting and Brazing Practice, by David Baxter	21-22-26
Practical Hints for Shop Mechanics.....	28-30
Readers' Questions and Answers.....	32-34
Up-to-the Minute Garage Equipment.....	36-38-40
Accessories—Dealers' Key to Profits.....	42-44-46
Here and There in the Motor World.....	48-50

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New York Office, 1181 Broadway

3350 N. Illinois Street, Indianapolis, Ind.

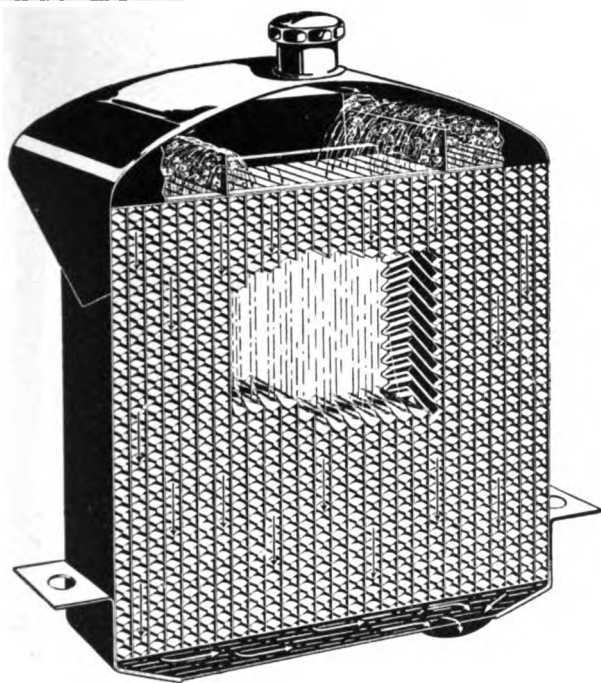
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WON'T BOIL WON'T LEAK FREEZING HARMLESS

Do You See How It Works?

Anyone mechanically inclined can see from this illustration what a wonderful radiator this is.

See how the motor temperature is kept constantly at the most efficient point by the action of the water itself—no thermostats or shutters, nothing to get out of order.

See how the water circulates in the outside sections of the radiator when the motor is cool, and as it gradually warms up the water expands, flows over the plates in the top tank, thus bringing the central portion of the radiator into use and keeping the motor temperature the same summer and winter.

See those flat copper water tubes that allow for unlimited expansion in case of freezing—they can't leak—and the brass inverted "V" type cooling fins that increase the cooling capacity 30%.

Exclusive Dealers Wanted

Curran dealers are making big profits. We give exclusive territory, good discounts. Sales are easy because thousands of Ford owners are continually replacing their radiators. The Curran eliminates all their radiator troubles and is absolutely guaranteed.

Territory is going fast. Write or wire today.

CURRAN DETROIT RADIATOR CO.
DETROIT, U. S. A.

CURRAN RADIATOR

NEW CARS from OLD



IT'S EASY Beats-All Way

to rejuvenate the appearance of any car in a manner that will delight the owner.

KNU-LAC Ford Top Dressing

One coat will positively waterproof and re-rubberize any top of the following types: Ford, Rubber or Imitation Leather. Incorporated into the base of Knu-Lac is a LIQUID RUBBER, which guarantees its Re-Rubberizing, weather-proof qualities. Knu-Lac is especially adapted for all FORD tops. No matter how old or porous the top has become, one or two coats of Knu-Lac will restore that original factory durability, causing it to become water-tight. Soft and pliable, it produces a rich gloss black finish.

Pints, 85c. Quarts, \$1.60.

GLOSS Black Enamel

The entire car with the exception of the top and upholstery can be handsomely refinished with this enamel. Its coalescent nature is such that it spreads and covers evenly, provides an enamel which an amateur can safely apply on his car with the assurance of producing a good job. Dries over night in a warm place.

Pints, 90c. Quarts, \$1.65.

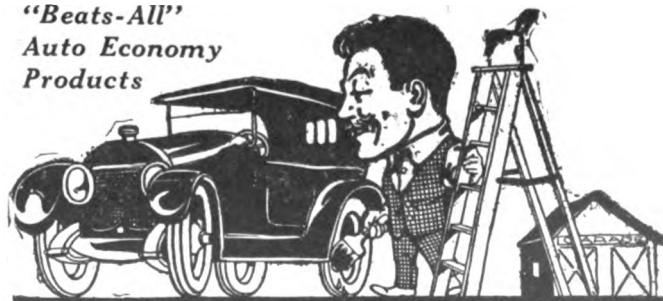
DEALERS—Get acquainted with the BEATS-ALL line—25 more Auto Economy Products—ask your jobber for descriptive catalog or write us direct.

Auto Specialties Mfg. Co.

40 Elm Street

Buffalo, N. Y.

"Beats-All"
Auto Economy
Products



BRUNNER

TO CORRECT FALSE CLAIMS

A Brunner single stage compressor does not consume more power than a two stage of equal capacity.

A Brunner single stage belted type makes less noise than a two stage of equal capacity.

Brunner compact construction eliminates the racking vibration of overhung, unbalanced two stage construction.

Brunner simplified assembly avoids air leakage characteristic of the complicated, multi-jointed two stage type.

Brunner accuracy of internal construction ensures permanently reduced friction load.

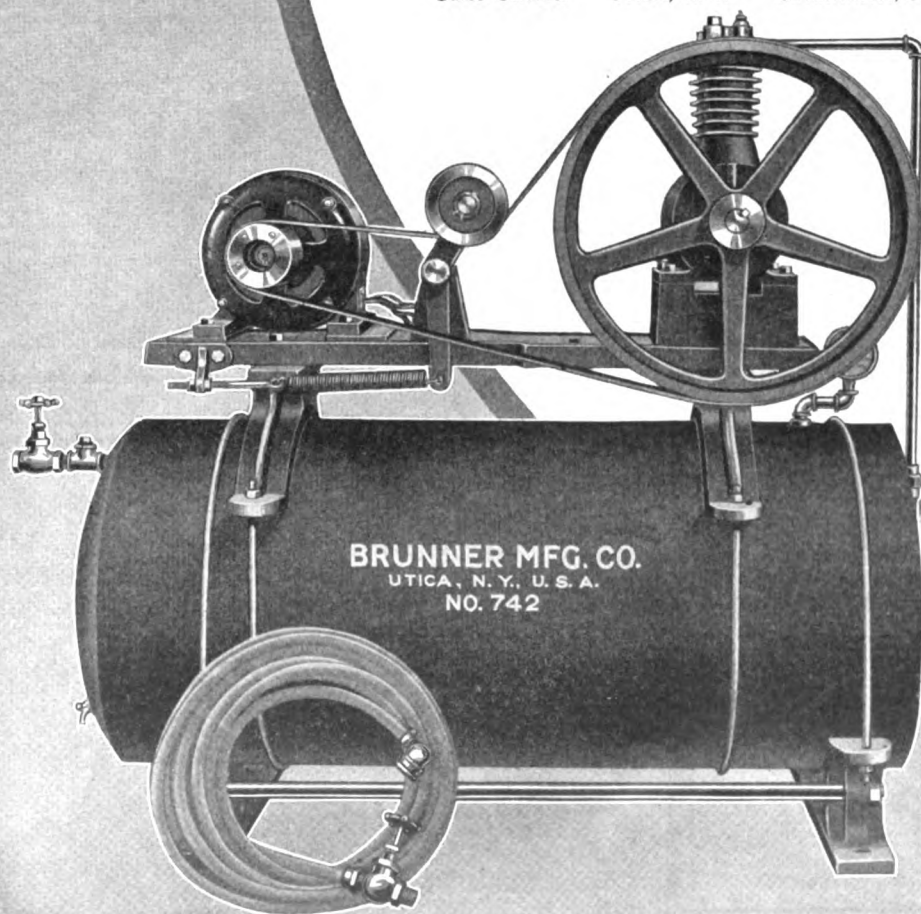
Brunner single stage compressors possessing the above distinctive advantages cost less to buy, less to operate and less to maintain.

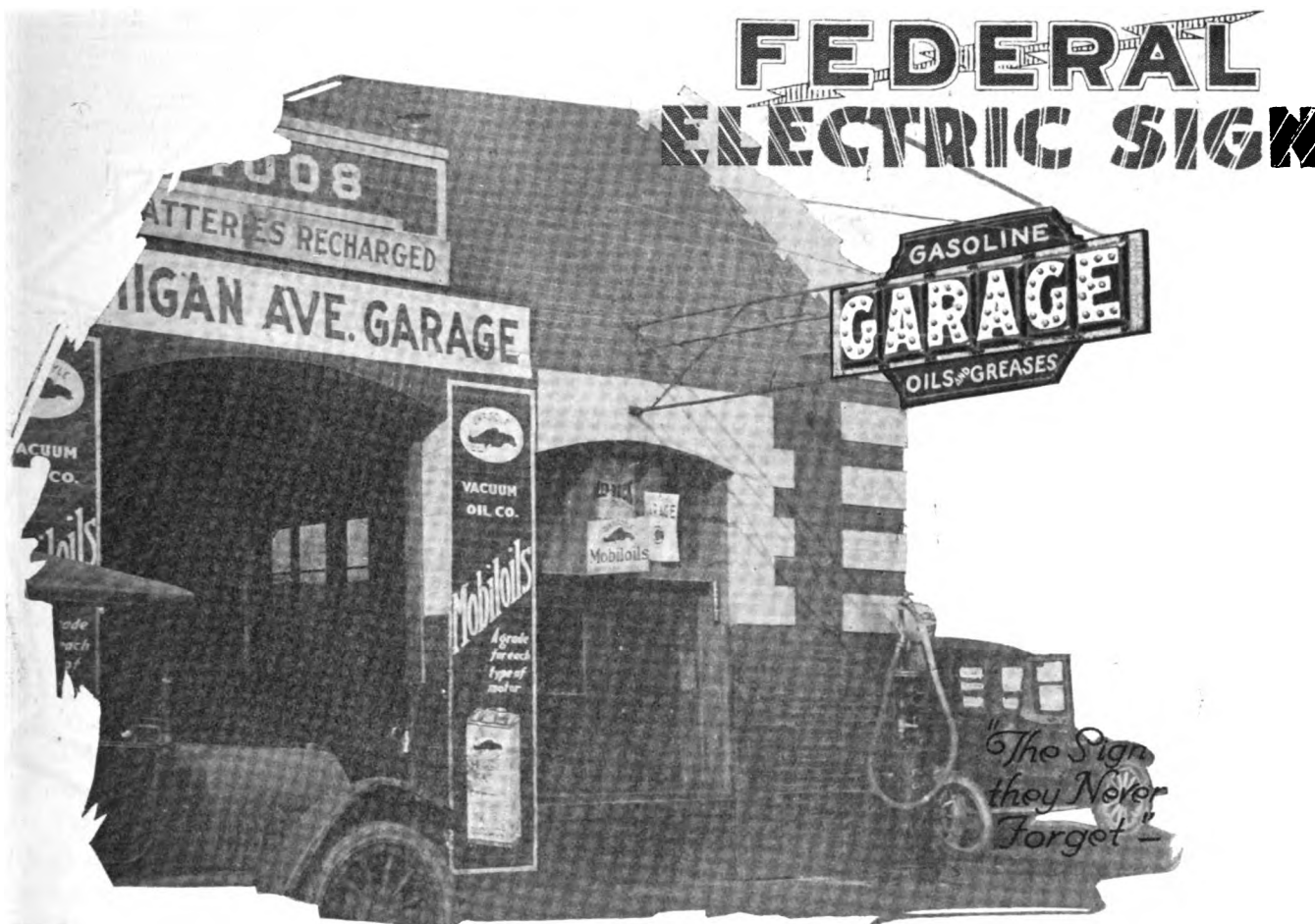
What honest reason for a two stage compressor?

Brunner Manufacturing Co.

Works: UTICA, N. Y.

Sales Offices: UTICA, N. Y. CINCINNATI, O. KANSAS CITY, MO.





—Inexpensive Advertising That Brings Results

Because their garages are lost in darkness, many garage owners lose many sales. Their competitors, with glittering electric signs lighting up their garage front, pull much of their paying profits away from them.

Prospective customers will not waste their time trying to find you. They know what they want and need and will go direct to that garage that advertises for their

patronage—a Federal Electric Sign draws them like a magnet.

And electric signs are really the most inexpensive of advertising media. Costs but a few cents a day for electricity. Made of porcelain enameled steel—will not rot, rust or fade, and will last indefinitely.

Gain a step on competition. Send coupon today for full details, prices and **free sketch** showing how your sign will look.



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information, price and free sketch of a Porcelain-enameled Steel Sign for my business. Explain your 12-months-to-pay Plan.

Name City..... State.....

Street and No..... Business

Store Frontage..... No. of Floors.....

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

AGAD-3

DEALERS!

The
big demand
for

1921 M				
SUN	MON	TUE	WED	THU
1	2	3	4	5
8	9	10	11	12
15	16	17	18	19
22	23	24	25	26
29	30	31		

SPEE-DEE

is just ahead
Will you be ready for it?

SPEE-DEE is a consistent seller the year around and during the touring season the demand hits its high water mark. SPEE-DEE sales have shown remarkable increases year after year as it has become more widely known among the car owners and drivers.

The man who uses SPEE-DEE once becomes a constant user. This is why. Every man who drives a car has to stop once in a while to make some repair or adjustment that leaves his hands soiled. Cold water won't clean them and gasoline means chapped or cracked hands. In such a case, there is nothing like a can of SPEE-DEE. It effectually cleans greasy, grimy hands *with or without water* and without injury to the skin. No wonder the man who knows SPEE-DEE will not drive without it.



SPEE-DEE is unexcelled for removing spots from clothing and has many household uses. The price is so moderate that the user gets Big Value for his money.

Get your share of this year's SPEE-DEE business. Write at once for full details and dealer selling helps.

STATES CHEMICAL COMPANY
680 W. Austin Ave. Chicago, Illinois



American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 4.

CHICAGO

April, 1921

Build Highways This Year.

In his address to Congress April 12, President Harding discussed highways and the importance of the motor car. Said he:

"The highways are not only feeders to the railroads and afford relief from their local burdens; they are actually lines of motor traffic in interstate commerce. They are the smaller arteries of the larger portion of our commerce, and the motor car has become an indispensable instrument in our political, social, and industrial life.

"There is begun a new era in highway construction, the outlay for which runs far into hundreds of millions of dollars. Bond issues by road districts, counties, and states mount to enormous figures, and the country is facing such an outlay that it is vital that every effort shall be directed against wasted effort and unjustifiable expenditure."

The daily and periodic press carry the word that 1921 is to be a banner year of highway improvement. It is estimated by officials of the Lincoln Highway Association that, if present plans materialize, ten million dollars will be expended in the improvement of this great transcontinental thoroughfare alone.

More than one billion of dollars is available for road construction in the United States at this time. It is physically impossible, of course, to spend it all in a practical way in the course of the coming year, but a very great advance in highway improvement can be made.

Officials in charge of constructive

activities should be in a position to take first steps in obtaining necessary materials for road construction at the first available opportunity. The greater part of the delays of the past season were directly traceable to the handicaps of transportation. Material is now

WORK!

"What is the thing to be accomplished?

"What is the goal? What is the man, the state, the nation here for?

"Work—good, hard, honest work, will achieve almost any material things in this world, and work may be delightful, noble, exhilarating, fascinating. Work may be full of excitement, of satisfaction, of joy and happiness."—H. Gordon Selfridge.

available. The railroads are in a position to move it efficiently. What the condition in this connection may be three months from now is more or less speculative. The thing to do is to get to work at once.

An early start in highway building will give employment where employment is needed. It will permit a seasonable completion of the work in hand. It should be started now.

Renewed Activity in Industry.

April 12 the long-expected cut in steel prices by the United States Steel Corp. was announced. Of the basic commodities, steel was the only one in which a cut had not been made—cotton, lumber, wool and agricultural products having months ago under-

gone a drop in prices. With the drop in steel prices, the road is cleared for the readjustment which is so well under way.

The automobile industry was one of the first industries to undergo readjustment, and it is likewise one of the first to begin to recover. While some industries are still showing a decrease in output, the automobile plants are showing renewed activity.

From Detroit comes the news that during March 25,671 workers were re-employed in automobile factories, of whom 6,300 returned to work during the last week of the month. In Cleveland there were 1,500 more employees in the automobile plants on April 1 than on March 1, a gain of 24 per cent.

Reports from Akron state that 1,000 men will be re-employed by the Firestone Tire & Rubber Co. during this month, and production will be increased nearly 50 per cent. The Goodyear company will re-employ 1,200 men—and it is expected that altogether 5,000 of Akron's idle factory workers will be back at work before May 1.

During the first week in April, 100 per cent production schedules were placed into effect in Detroit in the plants of the Paige-Detroit Motor Car Co., Studebaker Corp., Hupp Motor Car Co., and Federal Motor Truck Co.

Officials of the Packard Motor Car Co. predicted that April production would be 50 per cent greater than it was during January, February, and March, and would attain a 100 per cent basis May 1. Production in both plants

of the Hudson company is 50 per cent greater than in March and more orders have been received for Hudson and Essex cars than can be filled in the next 60 days.

The Maxwell-Chalmers Corp. will produce 75 per cent more cars this month than in March. The Signal Truck Co. increased its production 20 per cent April 1, while the King Motor Car Co. resumed operations in its new plant and officials expect production will be back at normal in less than 30 days. Plants in other cities also report 100 per cent production.

All of these facts are indications that the automotive industry is exhibiting more improvement than other lines of business and those in closest touch with conditions believe that the improvement will continue.

Don't Overlook a Prospect.

An editorial writer in Hyatt's Tractor Tract sets forth a criticism or complaint that is of interest in these days of "a buyer's market." Here is what is said:

"Some of us speak of the automobile industry as being on the decline—as having been overworked.

Maybe so, but let me tell you something:

I live right in Chicago. There are three automobile dealers in the same block where I live. I know their wives and children. My office is in the heart of 'Automobile Row.' I ride to work in company with automobile men. I eat my lunch in among automobile salesmen. I frequently attend their sales conferences. I compliment their products and criticize their advertising. I rub shoulders with them close to 365 days in the year!

I do not own an automobile. I have never owned an automobile.

I am not prejudiced against automobiles—in fact I rather like them. Whenever we have a nice warm day I envy the motorist. Every time I call a taxi I wish that I owned a car.

Comparatively speaking, I am able to own an automobile. I can't recall a single time during the past five years

that I couldn't have raised the price of a reasonably good car on 24 hours' notice. By all the rules of common sense, by all the laws of good business and high-pressure marketing, I flatter myself that I am a middling good prospective customer for a motor car. *But never, in all my life, have I been solicited by an automobile salesman!*

Now I don't wish to burden you

Don't dismiss the proposition to install up-to-date equipment of some kind as too expensive or not to be considered. Weigh the matter carefully. Perhaps you are paying for that new cash register, or lighting system, or advertising service—paying for it but not getting the benefit of it. It is this way: If you lose business or money because of antiquated business methods you pay for improvements all right, only the other fellow gets the pay and the improvements too, while you who are helping pay the bill, get along any old way and think you are economizing.

with a story of my life, but it seems to me that there's a real lesson in this.

There are many other prospective customers for motor cars who could make a similar confession."

And we know that he's right as regards Chicago—but how about the smaller cities and towns? We doubt that there are many residents of the smaller communities who can make a confession similar to that of our Chicago man. There's a thought in his criticism though—make sure that no one can say the same thing in your town.

First Sale Never Pays its Expense.

"Why is 90 per cent of the business brains concentrated on the sale while only 10 per cent is used in securing and maintaining good will?"

That is a question which was recently asked by a man experienced in merchandizing—and the one to whom he directed the question had no other answer than that it is due to lack of real thinking and planning.

"Do you know," continued the merchandizing expert, "that successful business is based upon the good will of the customer, for the *first sale never pays the expense?*" The general viewpoint of the average salesman is that he is not interested after the sale is made, and that is just where the big mistake is made.

How is business lost through poor contact and how may it be regained by the right treatment? The first of these questions undoubtedly can be answered by every automobile dealer and garageman—and there are many car owners who can give most positive and emphatic answers.

Are there, Mr. Garageman, in your town persons who were former customers and are now no longer on your list of patrons? Do you know why they quit?

Undoubtedly, the reason in many cases is due to what may be termed "tremendous trifles." *Trifles make perfection, but perfection is no trifle.*

Several years ago a service man employed in one of Chicago's large stores sent out letters to persons who formerly had patronized the store, but were no longer carried on the concern's books.

He frankly asked them the reason for the withdrawal of their trade. And he found out that the great majority quit trading at this particular store because of "tremendous trifles"—due to concentration only on the sale and not on the service, by means of which good will is secured and maintained.

Instance after instance can be given of these "tremendous trifles"—greasy dirt on car cushions, missing tools, little scratches, small overcharges, but why continue? You all know them, and every car owner has his pet one to tell whenever opportunity arises.

So we come to the conclusion that more than 10 per cent of the business brain should be concentrated in building good will for business. And good will is built through giving service—not by following the Golden Rule of some salesmen, after making a sale, of "beating it." Build good will by taking care of the "tremendous trifles!"

Counteract “Dull Period” Resistance

**“Interest Salesmen on ‘Own Hook’ ” Says One of These New Jersey Hustlers
“When Other Lines Are Dull, Push Accessories,” Says the Other—Both
Believe That There is Plenty of Business for Those Who Will Go After It**

By K. H. Lansing

There are various means of increasing business in the automobile trade by way of overcoming dull periods, but C. R. Ely, authorized Ford dealer, 24-26 Broadway, Camden, N. J., has

prospects and customers who otherwise would not have been reached within so short a period.

Ely has found that about 75 per cent of the families thus called upon, answer the bell. But isn't it generally the women members of the households who come to the door, or, if they employ servants, receive the caller? Certainly—but that is just what Ely likes to have happen. Indeed, as will be noted farther on, he has on a composite card for prospect, salesman, and owner—a form largely original with this house—an entry headed "See Wife"; an entry, by the way, never before seen by the writer on any form.

Ely evidently realizes that the women in the family not only wield a great influence today on the style and make of car purchased, but also are in most cases the "purchasing agent" for the home. He knows, too, that women today "read up" more closely on the refinements of the motor car and keep abreast of the changes, in many cases, with almost as much interest as they do with the variations in garment styles.

And how do the salesmen feel about this "doorbell campaign?"

Perhaps that is best answered by reference to the fact that Ely is having constructed a fireproof cabinet for his office, with space for 10,000 addressograph names. Camden, N. J.

has about 116,000 population, but Ford dealers aren't restricted as to territory.

Ely has removed another restriction which obtains in most automobile

Ely Is the Bigger Part of Rely

Put an R in front of our name and you have our **SERVICE** policy.

It is the big thing about Ely service that you can always Rely upon your work being done promptly and efficiently.

That is because we have the organization, a large force of competent mechanics, and a complete stock of parts.

"Rely on Ely" is byword with Ford owners.

C. R. ELY

AUTHORIZED *Ford* DEALER

We Sell Everywhere

Time Payments

24-26 Broadway, Camden

Originality in Advertising Is Ely's Hobby.

chosen newspaper advertising of a special character, and a house-to-house canvass.

"Do it with machinery," appears to be his slogan, as he sits in his office surrounded by a dictaphone, a Burroughs adding machine, an addressograph, a graphotype, an L. A. Fischer bookkeeping machine, a Todd proteograph and a National cash register.

These devices help to relieve him from details, releasing him for active work in concentrating his attention upon sales and advertising. He has one competent man entirely in charge of service and another to look after parts. Five salesmen help him get the prospect's name on the dotted line.

Supplementing this special drive on prospects, is Ely's usual method of using posters on billboards. He has 14 of these in permanent commission at strategic points about the city and its environs.

He divides the city into zones, or districts, and has his salesmen engaged in the drive ring doorbells and make inquiries until they have completely covered their territory. This intensive work has unearthed many

Good Service Is More Than Good Intentions

Good intentions may be fine paving material, but they cannot replace broken parts of an automobile.

No matter how willing your service man may be to get your car out of the repair shop promptly, he can do nothing unless he has a complete stock of parts and experienced mechanics.

We have

That is the reason Ely Service is prompt and efficient.

C. R. ELY

AUTHORIZED *Ford* DEALER

We Sell Everywhere

Time Payments:

24-26 Broadway, Camden

Good Service Brought Ely Success.

agencies. None of his salesmen "owns" a prospect in any sense of the word. He has put into operation a system whereby salesmen even work together to "land" a prospect. There is, therefore, no "register," as in many offices, to show what particular salesman "has" this or that prospect—the salesman's name in the book after the prospect's being a warning to other

[illegible]

Record Card Which Gives Full Information and Saves Paper and Bookkeeping.

salesmen to "keep off" till a certain period has expired.

This kind of arrangement finds favor no longer with Ely. He has tried it and found that it pays better to let a prospect be fair quarry for any salesman on the force who can sell him. "The man who closes the deal is the one who counts in the transaction," says Ely.

He has one salesman, whose name he does not care to divulge, whose earnings last year amounted to approximately \$8,600. That indicates whether the members of Ely's force have "closing" enthusiasm. "Interesting the salesmen on their 'own hook' seems to be the best plan," asserts Ely.

Supplementing the canvass are circular, or "follow-up" letters of the usual type—that is, there is nothing extraordinary about them. There are eight in the series, sent out two, two and a half, and three weeks apart. At the last report about 1,300 circular letters had been issued to the persons called upon in the "doorbell" campaign.

The advertisements now being run are double-column display, five inches in length. The copy is changed daily for them and, as the accompanying samples show, is somewhat "snappy." They appear in both of Camden's daily newspapers. In each advertisement appear prominently between the name and the address, the notices "We Sell Everywhere," and "Time Payments."

The "Salesman's Daily Report" is a manila slip 6¼ ins. by 4⅞ ins. It is exactly like the permanent card, 8 ins. by 5 ins., which is filed with a different colored tab for each salesman. Every prospect listed in this way is called upon at least once a



"Other Lines Dull, Push Accessories."

month. The permanent card is really a composite of five cards which otherwise would be used, and gives the information needed in the most concise way.

Original points in it are the "See

Wife" column, already mentioned, to be checked according to date of call; and the placing of the date of follow-up exactly on a line with the date of call. At the top are figures representing the days of the month. The entries for data are as follows:

Name, address and business of prospect; condition of place; name of

ELY-ISMS.

"See the Wife"—that's one of Ely's tips to his salesmen.

* * *

"I never take a used car in trade—you don't ask your tailor to accept your old suit as part payment of your bill. But if a customer has a used car, I will try to sell it for him."

* * *

"The salesman who actually closes the deal is the one who counts. No salesman here 'owns' a 'prospect', but many do teamwork to turn him into a customer."

* * *

"Interesting the salesmen 'on their own hook' seems to be the best plan."

salesman; type of vehicle; telephone number of prospect; his nationality; cars he owns; date of call; interviewed; not in; interested; money matter; see wife; garage; used car to sell; property to sell; horse to sell; car too small; date to deliver; closed; delivered; follow-up date; office follow-up, subdivided into headings, "Method," and "Date"; further information on used car for sale, as make, year, condition, rubber, price and remarks. Under "Method," for instance, will be entered whether by personal call, or by circular.

Many of these entries are not found on stereotyped record cards, but all of them have their uses for Ely.

Note the "used car for sale" entry. Ely makes a practice of never taking a used car on a trade-in deal, although he will try to sell it for the customer, or at least furnish him with a prospective buyer. "When you buy a suit of clothes, you don't ask your tailor to take your old suit as part of the price" he argues. "Why should the car dealer be expected to take an old vehicle?"

During the canvass from house to house, it has sometimes happened that the deal was closed ahead of the time entered on the card under the heading "Interested."

Every morning a clerk leaves for each salesman a slip whereon are noted the calls he is to make on prospects.

These dates have been transcribed from his daily reports. Should the salesman find that he has indicated too many calls for any one date, he spreads them out over a longer period.

Up to the present Ely has not dealt in accessories. He has a well-equipped and busy repair shop, the cars waiting to be repaired and some just finished, often forming a long double line on the side street.

* * *

Business slumps have no terrors for a human dynamo like L. O. Hensinger, general manager of the Summons-Patterson Motor Co., Inc., of Woodbury, N. J.

This town has only 7,500 population, but the company, which is agent for Dodge passenger cars and Rowe trucks, operates both in its neighborhood in New Jersey and in Pennsylvania. Lebanon and Berks counties are especially the company's bailiwick in Pennsylvania for the sale of passenger cars, and the territory for the trucks comprises all of the Keystone State.

Hensinger is so busy that it is hard to find him when he is not walking rapidly about the place, and he is rarely still for more than five minutes at a time unless he is selling something, closing a deal, or dictating a letter.

Then take D. H. Summons, president of the company. He has no "hifalutin" ideas about sitting around in a swivel chair, keeping his cuffs clean. He goes out daily, digs up business, and sells with the rest of the "boys," and sets an example in the snappy manner in which he gets the customer's signature.

Everybody works hard, from the small boy who helps out at the office,



A Complete Vulcanizing Department.

and supplies cars with gasoline and air at the curb, to the man who sweeps out the place. And with all this energy, of course, there is resourcefulness.

If sales of passenger cars are hesi-

tant, why, there's the truck end of the business.

If the public doesn't seem to have any great enthusiasm over either of these for the moment, there's the garage—the company has built up a large car storage business. Nightly examination of every car, with a note left on Hensinger's desk by the night manager, is usually productive of repairs or adjustments on some of these machines, and newspaper advertisements help bring in trade.

The company has what it considers to be the best equipped repairshop in southern New Jersey. For instance, this shop, which is in the basement, includes in its outfit a 24-inch drill press, several electric portable drills, an arbor press, a high-speed lathe, a forge, acetylene welding equipment, a power saw and a full complement of the ordinary bench tools. Even frames are straightened here.

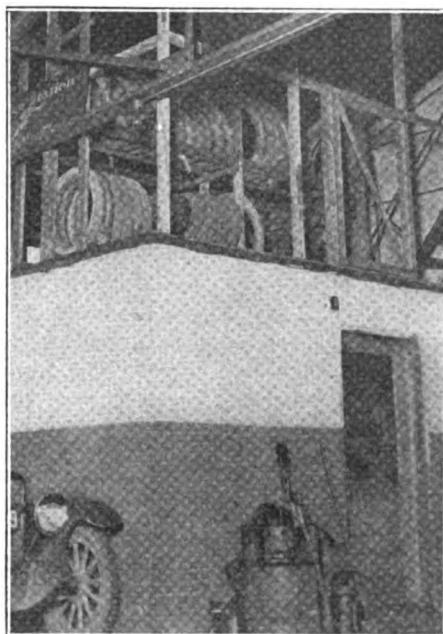
"When other lines are dull, push accessories," says Hensinger. And the company is well fitted to do this. Its capacious front office, to the left as one enters, across the driveway from the showroom, has large and well-stocked display cases, shelves and bins containing automotive equipment.

The stockroom also holds a good reserve of these wares, and among them are included everything in the way of motor car and truck fittings that can be purchased in a large city.

Again, should there be a lull in sales of accessories, as well as in passenger cars and trucks and should storage and repairs be slow, the company will try to stimulate especially the sale of tires.

It is agent for Goodyear, Republic and United States tires for automobiles and trucks.

So that tires can not be forgotten by the customer who drives in to have his car stored, to buy anything, or to have repairs made, a special "tire mez-



Tires Seen and Stout Wire Protects Them.

zanine," with a noticeable, broad, white band painted on the bricks at its base, occupies the most conspicuous angle in the driveway. This mezzanine is reached by an interior stairway, and the tires are both exposed to view and protected from theft by a front of stout poultry wire. The door at the foot of the stairway usually is kept locked to keep out undesirables.

Should all lines mentioned, including the sale of tires, be at a standstill, there are always plenty of tires to be repaired, even in a town of 7,500 inhabitants. On the second floor of the building is the most complete vulcanizing outfit in the city, with retreading equipment, tube plates, and all the various paraphernalia that go to make up a repairing department. A drive by this department usually gets more business than can be attended to readily.

In a partitioned-off section of the first floor is a battery sales, repair and recharging department, which is active at all times, but which is "speeded up" at signs of a "fadeaway" in any other line of business.

Then there is a well-stocked parts department for both the Dodge car and the Rowe truck. It is surprising how much stock can be turned over when suggestions are made to car and truck owners in the right way when they call to store vehicles, or have them repaired.

The company keeps up to date with its department forms, as well as in its selling methods, on the principle that orderliness and progressiveness makes for speed and time.

All of these numerous lines help keep business going well, backed by the indomitable energy of the personnel. That the company has faith in the future of the trade is attested by the fact that, notwithstanding it occupies a building of some 70 feet frontage with a 500-foot depth and a wing 300 feet in depth, it will build an addition as soon as possible.

The Spirit That Wins—"Be a Booster"

Garageman Tells the Value of Being Public-Spirited—Unload Responsibility on Employes as They Are Able to Shoulder It and Make Time for Other Things—Active Participation in Community Activities Good Advertising

By Earl Bullock

In our town is a garageman who never appears to be so busy that he can not spare a few moments, or hours and days if necessary, toward helping out any public-spirited movement.

It seems that when anything for the public good is really to be done, the leaders pick this man with unfailing promptness for a leading role in the project. And they never have been disappointed. Once his interest is

aroused and he feels that the movement really will benefit the public as a whole, he goes into the thing with whole-heartedness that is irresistible and the thing is put over in record time.

During the past few years he has received more publicity of the favorable sort than any other single individual in our town. Regardless of the fact that he never appears to be a slave to his business, it has pros-

pered nevertheless and has grown from small beginnings to one of the largest of its kind in the city. When he is at the office, he has time to see everybody from the most humble employe to a curious person, such as the writer, who desires to find out how it is possible.

Three attempts were necessary before this man could be caught in his office and subjected to a few questions. On the first visit it was found

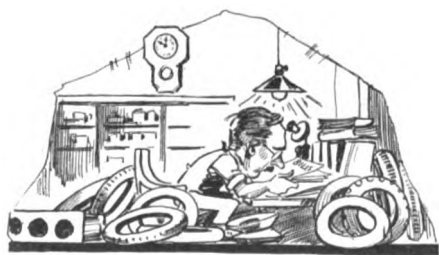
that he was out at the head of a team of willing workers trying to beat another team of equally willing workers in securing a larger number of members for the Chamber of Commerce.

The second attempt discovered that he was out at the head of another team trying to raise more money than any other team for a Community Chest fund to take care of all the regularly organized charities for a year. Having profited by two ineffectual attempts, a telephone appointment was made the third time and he finally was "bearded in his den."

This is being written in the first place for the benefit of those selfish individuals who believe the particular business in which they are engaged should be uppermost in the mind night and day; for those persons who, when asked to join some organization, ask right off the reel—quick—what they are going to get out of it; for those individuals who can not see ten feet ahead of a dollar and can not stand to see one depart from behind "the loose brick in the mantle place" unless five more will return of their own free will and accord the next day; those men in the trade who feel they have to be tied to their work from early morning until late at night, and for this reason are not even well acquainted with their families.

The conversation, stripped of the questions, which are of no moment, was about as follows:

"I came here about seven years ago. I was in business in another state and just about broke even. Before disposing of the business there I took an inventory of myself and discovered that I was immersed in business to such an extent that my perspective was all warped. I discovered that I was



"I Was So Immersed in Business That My Perspective Was All Warped."

selfish and knew I had few personal friends. I knew if I ever was to change I should have to change cities also, so I sold out and changed.

"My first official act after getting the business started in the new location was to join the Chamber of Com-

merce, something I had not thought necessary before. Then I could not see what good I could get out of such an affiliation and hated to spend the money. I began taking lunch there regularly and got acquainted with other business men. One day I was taken as a guest by one of my new acquaintances to a luncheon of a business club—to illustrate, it might have been the Rotary Club, the Kiwanis Club, the Optimists' club, the Exchange Club or what not, but in my case it was the Kiwanis Club.

"They had such a good time that I determined to join, if possible. I found my classification was open and shortly afterward was admitted to membership. Here, I made more new friends. Eventually I joined other clubs of a similar nature so that now I have a luncheon every day in the week except Saturday when I go to the Chamber of Commerce.

"Every day I saw men, whose businesses were much larger than mine, have time to do many of the things I would like to have done, so I set to work to build up my business organization to the point that I could be spared. I began placing responsibility on others at the office and those who would not accept responsibility found their places taken by employees who would. You can't do all the work yourself.

"From these business men with whom I got acquainted, I found out how they arranged their business affairs to have some spare time and I benefited accordingly. For a time I believed that the money spent in these outside diversions was to be charged to profit and loss, but now I know differently. Both time and money spent should be charged to advertising and I will tell you why.

"During the first six months in the new location, I advertised pretty heavily and naturally got returns. During the next six months the sum appropriated for this purpose was about the same and the returns were about 25 per cent greater. There is no reason why returns from the same amount of advertising should show such an increase in six months for the same amount of money spent and I finally awakened to the fact that many of the accounts were those of the personal friends I had made. That gave me a different insight into the value of personal acquaintance.

"And there is another value that it took me months to see; namely, the

effect on the employees of being widely known and recognized as a booster. Ideas I picked up here and there over the luncheon table prompted the organization of a bowling team and a baseball team to represent the business, both of which have worked won-



"That Gave Me a New Insight of Personal Acquaintance."

ders toward creating that spirit of co-operation between employer and employe which is so much desired. I have never had any labor dissension since I changed my habits. My employees know that if they ask any reasonable adjustments, they will receive a fair hearing and we reason out the matter.

"Here is another thing I discovered later. Organization work among those engaged in my own business is invaluable. That is another item of minor expense I always used to consider idiotic and, therefore, never indulged in. Now I know better. I never shall forget the ideas I got at the first trade convention I ever attended. I went with some qualms of conscience over the money it would take, but I came home with the knowledge that the money had been well spent and with the firm conviction that I should never miss another.

"If you charge the money spent and the time lost from business trying to promote the civic good to the advertising account, you will find that the returns are probably greater for the amount invested than returns from display space, though the latter, of course, is invaluable. Both are necessary, for the one ties right up with the other. Then from the selfish side of it purely, remember that anything that helps your particular community helps your particular business.

"Understand, I am not trying to advise just how to get this acquaintance, nor am I conceited enough to believe I have found the ideal way, but what I want to get across in this interview is that business will increase in proportion to the number of acquaintances of the personal sort. Try it! Results are certain."

A Word to the Wise—"You Tell Em!"

When Dealers Tell Their Customers What to Expect in the Way of Service From Accessories, They Save Much Time and Trouble—Why?—Because the Other Fellow is Never Given an Opportunity to Be Disappointed With Results

By Fred Counterman

Do you want to save yourself a lot of trouble—a thousand difficult adjustments of complaints, scores of instances of dissatisfied customers? Of course, you do because complaints and dissatisfaction and trouble, where your customers are concerned, mean an ultimate loss of business.

The answer is: Take more time and pains in telling your customers what results they may honestly expect from the cars, or parts, or accessories they purchase, and what they must do to get those results.

You do and you always have given customers instructions about their cars—and you have told them something about the smaller purchases, especially when they asked a lot of questions. But, to be frank about it, have you told them enough? Haven't there been plenty of difficulties that have arisen just because you did not tell them all you might have told?

When a man buys a new car from you, you say something to him about the wisdom of driving not faster than 25 miles an hour for the first 500 miles, but do you impress it upon him that you mean it, that there is a very important reason for that precaution?

You know how it is when a man gets a new car. He wants to show somebody its heels right away. He wants to see what it will do. It will take more than a mere hint to get him to exercise the care that is worth exercising for a while.

Tell him so he will understand it. Scare him a little if you can, by making him see that he may ruin his engine or, at least, shorten its life materially. Make it plain that he will profit largely in money and satisfaction, if he will save his speed tests until the car is worked out.

Plenty of automobile buyers don't know the first thing about machinery. They don't know a camshaft from a timing gear and probably never saw either one. You tell them what an important thing it is to treat a good machine right, especially when it is new.

And a similar sort of warning should be given about new parts and

accessories. Their proper use should be explained—and it is worth while to remind the driver that new parts of certain kinds when attached for the first time, certain accessories when first applied to the car, should be watched because there will be a tendency at first for nuts and screws to loosen up with the vibration. After the first use, the connections ought to be examined and tightened. A careful tightening of all such connections after a few hundred miles may save a good deal of trouble.

A motorist may buy a new battery, different from the one that came in the car at first. The new battery may not fit exactly the space allotted to it and in putting it in not enough care may be used to get it set firmly and in a solid position. As a result, it may work loose and rattle, the connections loosening and making the current uncertain, even affecting the engine. Or the battery may be so set that in time vibration cracks a cell and the owner gets a leaky cell.

You tell the motorist, when you sell him a new battery, to be sure and come back within a specified time and let you see whether the battery fastenings have worked loose.

A new tire carrier may work loose and make trouble, just because no one took the pains to tighten it up occasionally for a week or so until it got firmly set.

You put on a new fan belt for a customer you know to be careless about the care of his car. If you do not impress him with the importance of the matter, he may give that fan belt no attention, and in a couple of weeks it is loose, his engine is heating up and he is kicking.

In the case of carbureters and other more or less complicated mechanisms, if you expect the purchase to give satisfaction and do all you have claimed for it in urging its purchase, you must tell the buyer everything he needs to know about the new equipment and make him understand it so the attachment will get a square deal. Some such attachment may call for a very different adjustment of

dash levers controlling air or gas or spark. The buyer will not know any more about it than you tell him.

Many things about the operation of an automobile look so simple to the inexperienced driver that he does not realize that there are any underlying difficulties that he ought to thoroughly understand.

You cannot leave anything to the imagination of the average automobile driver, the private owner, and be at all certain that he will do it the right way. He seems to guess wrong when there is only one chance in ten.

Take the matter of tires: Users are worse offenders in tires than in any other form of motor equipment. The manufacturers have had enough to say and the motor magazine writers have emphasized sufficiently the necessity for keeping tires well inflated and for filling up holes and cuts promptly, but the average driver pays too little attention to such things, and I doubt whether the average dealer, when making a sale, emphasizes them enough.

I have bought and used pneumatics for many years, and I cannot recall a dealer ever having cautioned me personally about the care I ought to give the tires he sold me. They have told me a great deal about the quality of the tires, and they have spread it on pretty thick about what I could expect from the tires, but after they had me sold, they never gave me a hint of what it was my part to do in order to get the mileage from the tires that they had so glibly promised me.

What the dealer says plainly and emphasizes in making a sale will carry more weight than anything the manufacturer puts into his literature—more weight than what the buyer reads in his motoring magazine.

If the dealer will tell his customers what they should, themselves, do as their part of getting full value and perfect service from their purchase, he will find his customers standing by him. He will hold their trade, because they will be satisfied and not disappointed with what they buy.

You Cant Judg a Man by His Cloze

Josey Ought to Forget That Whooz Who Stuff—The Boss is Mitey Particular About Our Windows—Sum Places Get Their Windows Washt This Morning and Then Dont Put Ennything in Them Till Tomorrow. Aint That the Limit?

By Frank Farrington

Deer Pete:

Do you hav enny book on whooz who in Pinkvill? I guess if you did it woodent cut enny ice with you wood it? It woodent with me either becaws I don't care whooz who in Pinkville or here in Pike Citty or enny place else but that aint the way it is with sum fellers. Now take our Josey, one of our mekannics that likes to get dresst up so flossy when he can get the black off his face. He thinks sum fokes munny is better than others, I gess, by the way he ackts.

The other day I was washing the inside of a window where Spike was going to put sum tires and in cum the mayer, the big noize in Pike Citty. He alwys goze around looking like a million dollars, with a plug hat and a cain. Youd think he must be going to buy a seed ann, at least, the way he swels up to where Josey was standing by the kerb pump doing nothing but thinking and not much of that. But between me and you, Pete, the mayer is a piker and smokes five sent ciggars and diddent buy enny libberty bonds.

Well Josey pretty near fel over himself husseling to say good day to his nibs and find out what he wanted, and he diddent even see anuther feller that had drove up ahed of the mayer and was waiting there to get a littel servis. Well, Josey was the onlie one out in frunt and the other feller had to stand and wait while the mayer askt a lot of qwestions about whats the cheepest way to fix up an old shu thats probly all gone ennyway.

This other feller that was waiting had on a pare of overalls and a jumper and he lookt like sumboddys hired

man in a ford that must hav bin a 49er. I see this feller kind of spoke to the mayer pretty familliar and I thought mebbly he was his gardiner or sumthing.

So by and by this other feller got out of his buggy and walkt up to where Josey was talking to the mayer about the old shu and coodent get his eyes off that shiney hat and fansy rig

When Josey cum along with the tires he sed to me "Did you notis the way that ruff neck spoke to the mayer?"

The boss was just cumming in and he herd that and he sed to Josey, "You bin playing faverits agen after what I sed about wanting every customer treeted alike in this garaje, whether he was a millionair or a factory hand or wore a plug hat or overalls?"

Josey coodent find much to say, except that he diddent think that man was very polight to the chief offiser of the citty.

"Jo," says the boss, "you got sumthing to lern and one of the things is that you cant judg a man by his cloze alwys. That was the mayer shure enuf but for cramps sake who made him mayer? Did-dent Burr White?

"Aint Burr White the boss

that got this citty rite by the neck, and heer youre salammng to that cheep mayer and almost refusing to do bizness with the feller that can make him mayer or unmake him mayer enny old day. Get wize there, yung man, and treet your customers all alike and all the best you can and forget this whooz who stuf."

Gee Ide of pade more attenshun to the mayer myself. Ennyboddy wood. But that shoze you cant tell and Ile bet even Josey wont be so keen after this to think the mayers the gratest man in town.

Speeking about I was washing windows, our boss is mitey particuler about that window washing bizness and when I got the window cleen and Spike wassent rite there to put his tires in rite away, the boss cum out and sed "Wheres Spike? Aint he got



The Feller Pulled Out a Wad of Bills as Big as a Tellephone Pole and Busted Rite Into Josey's Conversashun With the Mayer.

long enuf to see ennyboddy else. The feller pulled out a wad of bills as big as a tellephone pole and busted rite into the conversashun and sed, "Yung feller, get me a cuppel of new tires and toobs for this bote of mine here and put em in the back of it. Make it kind of snappie becaws Ime in a hurry."

Then he sed to the mayer, "Have a ciggar, Tom?" and he offerd him a long ciggar in a silver rapper. But the mayer just sed "No thanks," and Josey lookt like he thought this ruff neck working man ought to be slappt on the rist for speeking rite up like that to a mayer in a plug hat and cain.

The mayer turnd and went away and Josey finelly got waikt up enuf to go after the tires. Then the boss cum along and I notist the boss ackted like this last guy was sum punkins.

sumthing reddy to set into this window?" Thats the way he is. If the window's empty a minnit heez out to see why.

Spike always gets his new stuf all reddy to put in before we take out what was in there only this time his mother got sick and he had to go home an didn't hav no time to fix up enny windows. So I told the boss and he sed, "Put sumthing in there till Spike gets back. We dont want an empty window in our place with a hundred peepel passing every hour, and fokes bying gas stopping out in frunt and looking at that window."

So I got a big sine advertising our best tires and set it in there. I gess its a good ideeah not to leev the window empty when you dont haf to and

I dont see as youd ever haf to, Pete. But sum places get a window washt this morning and then dont put in ennything till tomorrow and lots of garajes dont put ennything a tall in their windows. Aint that the limmit?

Spike says one reeson why sum garajes fix up a window and then leev it forever is that they put in so much stuf that its a big job to take it out, and they dred it and dont do it. Theyd ought to put in not so much and then change it sooner so theyd keep fokes interested in their stuf.

I fixt up a window one time when Spike wassent there and I thought it was grate but he sed it was a joak and that it lookt like a set of sampels of everything in the shop. I thought it was fine becuz I thought the more

things I shode the more things wood sell but Spike says not.

He says you want to show one kind at a time and make it such a good show that the fokes who see it cant help remembering what they saw. He says its better for em to see one thing and remember it than to see a lot of things and not remember enny of them.

I kno theres always peepel speeking about things they see in our window, so Ime shure Spikes windows are all rite an he knos what hes talking about. And he always puts in a card that tells just what a thing is and how much it is, and a feller looking at the stuf dont haf to wonder much about it. Spike tells him whats what. I gess Spikes onto this window job.

Yours old chumb,

BILL.

Accounting:

The Fourth in the Series of Articles on Garage Accounting Taking Up and Defining the Liability Accounts Which Are Listed in the Chart of Accounts—We Shall Be Glad to Make Clear Anything That You May Not Understand—The Quiz Questions—The Chart for Reference

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specializer in Automotive Accounting

This month we shall undertake to define for you the liability accounts given in the chart of accounts, endeavoring to show the items chargeable to each and the reasons for using such accounts.

The chart of accounts is again repeated so that it may readily be referred to in the study of this article.

Notes Payable:

Credit this account with the amount of all promises to pay that have been issued, and debit it with all payments made on such notes and with the amount of renewals when old notes are cancelled. The balance on this account is a liability and will show the amount owed on notes issued.

Accounts Payable: Credit this account with the amount of all verified invoices on time purchases. Debit the ac-

count with the amount of all remittances to the vendors' accounts, with the amount of discounts taken on the bills, with the amount of rebates and allowances taken, and with the amount of other credit memos which are issued the firm by the accounts payable or vendors.

Notes Receivable Discounted: This

account has been charted in the assets division of the chart of accounts as a deduction.

Credit this account with the amount of all notes receivable discounted and debit it with the amount of the discounted notes paid or cancelled.

The balance will show the amount for which the firm is liable should the original maker fail to meet his obligations.

As these notes are liabilities only in case the original maker fails in his payments, they are commonly called a contingent liability.

Deposits Payable: Credit this account with the amount of all cash deposits to bind sales. Debit the account by the same amounts when sales are completed. The balance will be the amount owing customers on deposits on undelivered in those cases

Assets:	Liabilities:
Bank.	Notes payable.
Cash.	Accounts payable.
Petty cash.	Notes receivable discounted.
Liberty bonds.	Deposits payable.
Postage stamps.	Pay roll.
War saving stamps.	Accrued payables.
Notes receivable—less allowance for doubtful.	For a corporation:
Accounts receivable—less allowance for doubtful.	Capital stock.
Deposits receivable.	Surplus.
Merchandise—less allowance of depreciation.	Profit and loss.
Unfinished jobs.	For an individual or partnership:
Shop equipment—less allowance of depreciation.	Investment.
Office equipment—less allowance of depreciation.	Undivided profits.
Buildings and real estate—less allowance of depreciation.	Profit and loss.
Investments.	
Deferred charges to expense.	
Income:	Expenses:
Sales.	Service.
Cost of sales.	Sales.
Other income.	General or administration.
Additions to Income:	Deductions from Income:
Interest earned.	Interest allowed.
Discount earned.	Discount allowed.

Chart of Accounts Gives the "Present Worth" and "Results of Operations."

where your customer is a sub-dealer.

I would suggest that this account is superfluous in your chart. I believe in crediting cash deposits directly to accounts receivable and thereby eliminating deposits payable account.

Payroll: Credit this account with the amount of wages and salaries accrued for the pay period. Debit it with the amount of cash or equivalent issued to meet wages and salaries due. The payroll account will show a balance only when wages and salaries are not paid in full to the end of the payroll period. For this reason it is generally called a clearing account.

It will also show a balance when pay day and the end of an accounting period fall on different dates, in which case the balance on the payroll represents a liability, the amount accrued but not due on wages and salaries. Where the number of employees is few, the account is usually dispensed with and amounts issued to cover wages and salaries charged direct to wages and salaries by departments.

Accrued Payables: This account includes all such accounts as rent, heat, light, power, gas, taxes, wages, salaries, etc. As bills for these expenses are rendered at regular intervals—usually monthly in many cases—the amount varies from month to month and we can not make a true statement of our indebtedness without showing these amounts as liabilities whether they are due or not.

Credit this account with the amount of the expense bills rendered or the amounts actually accrued though bills may not have been rendered. Debit when the accruals are paid. These accounts are seldom carried on the average garageman's books. This is one of the gravest errors in many book-keeping systems.

Capital Stock: This account represents the total par value of the issued shares of the corporation. Although the capital stock account is probably kept only when it shows the issued capital stock, still accounts should be carried with "capital stock authorized" and "capital stock unissued," the difference representing "capital stock."

Capital stock may be of two kinds, common and preferred. If both kinds are issued, it will be best to set up the accounts "capital stock common" and "capital stock preferred."

Surplus: This account represents the undivided profits of the business. Credit at the opening of the books with the amount of excess of assets

over liabilities including capital stock. Credit with the amount of any adjustments made in the current accounting period which affect the profits of an earlier period and with the amount of gain transferred from the profit and loss account.

Debit at the opening of the books with the amount of excess of liabilities including capital stock over assets (surplus in this case is termed deficit) with amount of any adjustments made in the current accounting period which is a charge against profits of a previous period, and with the amount of the loss transferred from the profit

You despise books; you, whose lives are absorbed in the vanities of ambition, the pursuit of pleasure, or indolence; but remember that all the known world, excepting only savage nations, is governed by books.—Voltaire.

and loss account at the end of an accounting period. The balance of this account, if a credit, represents the accumulated undivided profits; if a debit, the impairment of the net worth or a deficit.

Profit and Loss: This account, for a corporation, is often called "loss and gain," but profit and loss is preferable because profits or revenues are more logically shown before expenses or losses in a financial statement.

This account represents the difference between the revenues and expenses from all sources at the end of a closing period. It is a profit when revenues are in excess of expenses and a loss when expenses are in excess of liabilities. No entries should be made to this account except at accounting or statement periods.

Credit this account with the amount of sales interest earned, discount earned and sundry income. Debit it with cost of sales, service expense, sales expense, general expense, interest allowed, discount allowed, and sundry deductions. The balance represents the profit or loss of the business for the period and should be transferred to the undivided profits account, if such an account is carried.

Profit and loss is carried to surplus at the end of the fiscal year. Capital stock, surplus, profit and loss, and undivided profits are known as the net worth accounts of a corporation. The net worth accounts of an individual or partnership are: Investment, undivided profits, and profit and loss.

Investment: Credit at the opening

of the books with the proprietor's or partner's share of the net investment in the business with all additional investments, with credit balances transferred from proprietor's or partner's personal accounts, with the net profits transferred from the profit and loss account at the end of a closing period; in the case of a partnership, with the partner's share of the net profits.

Debit with withdrawal of all investments previously credited to this account, with all losses not applicable to the current year's operations, with debit balances if any transferred from proprietor's or partner's personal accounts, and with net loss, if any is transferred from profit and loss account at end of a closing period; in the case of a partnership with the partner's share of net loss so transferred.

In case of a partnership, there should be a separate investment account with each partner. The balance after the books have been closed represents the net worth of the business or in case of a partnership each partner's share of the net worth.

Undivided Profits: When profit and loss is not transferred directly to investment, it is transferred to this account when figured monthly or oftener than once a year. This practice is strongly to be recommended. Credit with profits transferred from profit and loss, and debit with losses transferred from profit and loss.

Profit and Loss: In general, the remarks on a profit and loss account for a corporation apply equally well to a proprietorship or partnership.

(To be continued.)

Quiz Questions on Garage Accounting.

Define notes payable. What is meant by the term accounts payable?

What is the difference between accounts payable and accrued payables?

Where is the best place to carry "notes receivable discounted"—assets or liabilities—and why?

What is meant by deposits payable?

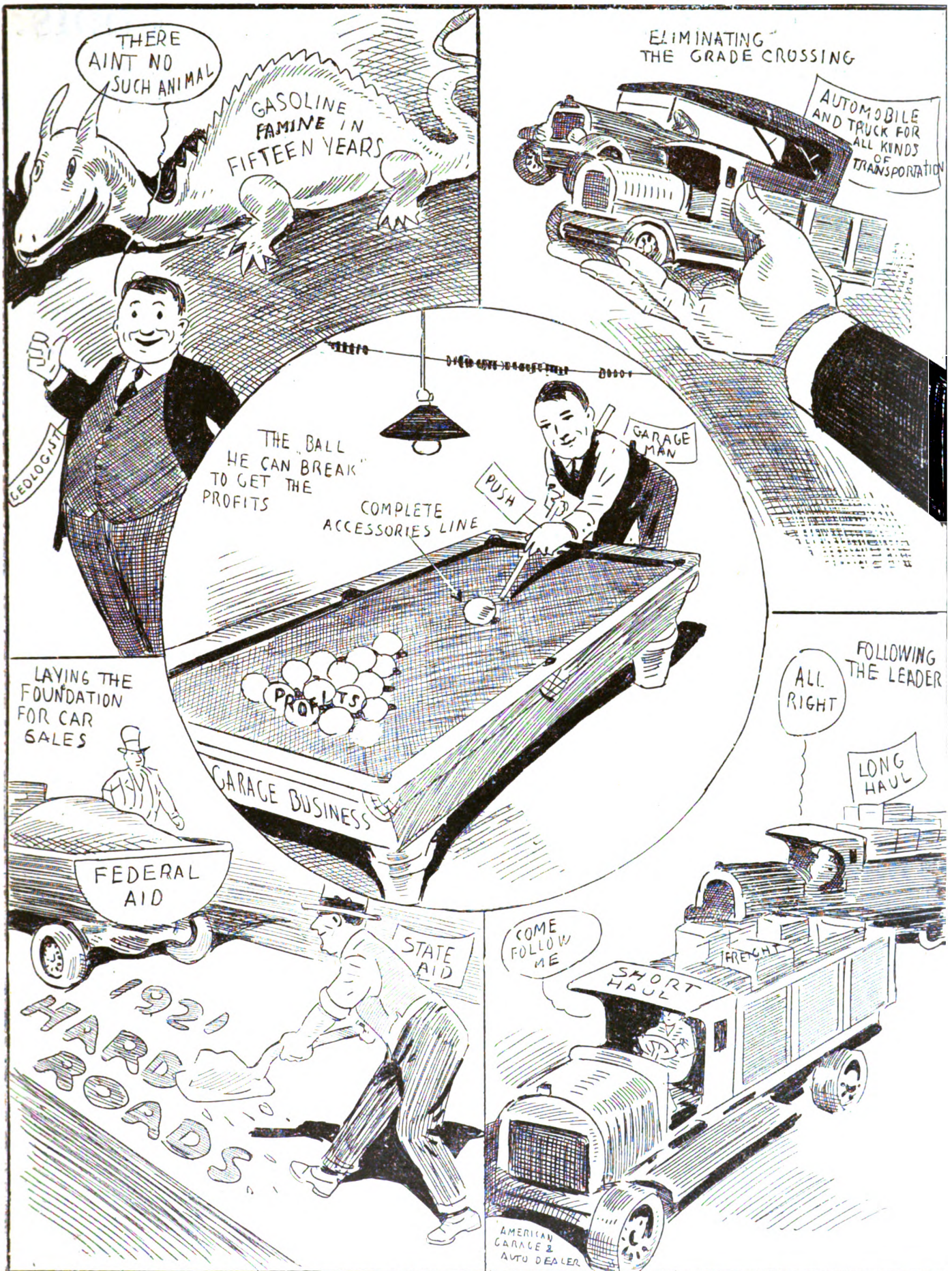
When is the account payroll debited and when credited?

Name some of the accounts included in "accrued payables."

Define capital stock; capital stock authorized; capital stock issued; capital stock unissued; capital stock preferred; capital stock common.

What is the distinction between surplus undivided profits and profits?

Define investment account. How many investment accounts should be carried in a partnership?



Who Is Liable for Defective Tools?

Every Employer Legally Required to Furnish Men With Reasonably Safe Tools—Must Instruct Inexperienced Workmen as to the Best Use of Tools
Some of the Exceptions Made to the Rules Governing Safe Appliances

By Chesla C. Sherlock

There is a legal liability upon every employer to furnish his workmen reasonably safe tools and appliances with which to carry on his trade or occupation. This liability is grounded in the old common law, rather than in statutory inhibition, but for the most part has been strengthened and enlarged by the statutes from time to time.

The fact that it springs from the common law does not mean that the employer who operates his garage or shop under the workmen's compensation acts is excused from obedience to these rules. The compensation acts merely provide a measure of damage for injured workmen after an accidental injury has taken place, while the rules as to safe appliances are enforceable because they seek to aid in the prevention of these injuries and accidents.

The general rule is to the effect that the employer must furnish reasonably safe tools and appliances to his workmen; that he must regularly inspect these tools and appliances and keep them in a proper state of repair; that in cases where the workman is inexperienced in their use, the employer must instruct him as to how to use them best; that if the employer, by reason of his superior knowledge of the work, knows of any facts or circumstances relating to their use, with which the workman is unfamiliar, the employer is duty-bound to impart that knowledge to his employee; and that at all times the employer is bound to exercise or furnish competent supervision over the work being done.

There are exceptions to this rule, of course. The very first exception of importance is that in the case of simple tools with which anyone and everyone is familiar, such as hammers, saws, chisels, etc., no such duty as to instruction as to use, or duty as to periodic inspection, rests upon the employer.

Another exception is where the workman himself is skilled in the particular work and is familiar with the tools and appliances necessary to carry

on that work. The theory here is that the skilled workman is just as competent to ascertain defects in the tools or appliances as the employer himself in that the employer in his "superior knowledge" of the trade or craft has nothing to impart to him.

Other exceptions might be enumerated, but for average conditions the ones mentioned are the most important. It is especially worth while for all employers operating shops and garages to take the law on this subject into consideration. Of course, if they are operating under the workmen's compensation acts, the measure of compensation which the injured workman may recover is specifically set out by those acts, according to the extent of his injury, but there are thousands of small garage owners and shop owners in the country who are not operating under these acts but under the common law.

These men are directly affected in greater measure than all others by the law in regard to tools and appliances. If they furnish their workmen with defective tools or appliances, they are, by that very act, deemed guilty of negligence and liable for damages to the injured workman, to any extent within the whim of the individual jury. They are not protected by the law to the extent that the garage owner under the compensation acts is protected.

In a Kentucky case, the employer was excused, where a workman was injured by a spike maul and claw bar, "as plaintiff's (workman) own evidence showed that he knew the condition of the claw bar, and, so knowing, made the stroke which resulted in the injury to himself. The fact must be given the same effect as if the duty of inspection had rested upon him; that in any event there was no duty of inspection upon the part of the employer and, consequently, no negligence." These tools were held to be simple tools and, therefore, exceptions to the general rule.

However, even in the case of simple tools, if the employer knows of the defect, and the workman does not,

then the employer is liable for negligence if he permits the tool to be continually used without remedying its defect or replacing it with a sound tool. The duty of the employer to exercise ordinary care to provide reasonably safe tools and appliances is absolute, and it applies to simple as well as to complicated tools. The distinction between his liability in the case of the two classes of tools is held to arise in the duty of inspection, he owing no duty of inspection in the case of simple tools.

But if the employer had actual knowledge of a defect in a simple tool, and the injured workman had no such knowledge, the employer is liable for exposing the workman to a peril unknown to him and must respond in damages. It is the duty of employers, then, as soon as they become aware of the fact that any of the simple tools used in their shops are defective, to make that fact known to the men using them, and to have the defect remedied as soon as possible. Otherwise, they have not exercised the "ordinary care to provide reasonably safe tools" imposed upon them by law.

In Oklahoma, it was decided, where the attention of the employer had been called to the defective condition of a tool and he directed the workman to go ahead and use it, that the question of whether the workman voluntarily or negligently continued to use the defective tool was held to be a question of fact for the jury to determine.

In Texas, it has been held that, where the workman has no opportunity to inspect a simple tool, the employer is liable for furnishing one which is defective. It is quite generally held that it is impossible to say, as a matter of law, what are simple tools, but that such determination will have to depend upon the facts in each case.

A hammer under one set of circumstances may be a complicated tool, or come under that rule, instead of being classed as a simple tool. For instance, a chisel requiring inspection and careful tests is not a simple tool, according to a New York case.

Welding, Cutting and Brazing Practice

Welding Torch Outfit Is More Versatile Than Welders Generally Realize
Method Used for Removing Carbon Deposits From Automobile and Tractor
Engine Cylinders and Motor Cycles—Some Unusual Uses for Welding Plant

By David Baxter

[**Editor's Note:** In Mr. Baxter's article in the March issue, errors were made in the titles given for four of the illustrations. The title for the photographic reproduction in column one, page 24, should be: "Spot-welding method employed on square corners." The title for the photographic reproduction in column three, page 24, should be: "Spreading sheets to prevent overlapping." The title for the drawing illustrated in column one, page 25, should read: "Sheets overlapping—Result of not spreading them apart before welding." In column three, page 25, the title for the illustration of the drawing should be: "The position of the torch and filler rod in ripple welding."]

The garage welder should know that his oxy-acetylene torch has many uses besides the mere welding of broken castings and forgings; many uses besides the fusing together of broken or severed automobile parts. None of them includes brazing and none includes metal cutting, for these are uses of the torch almost as well known as welding.

The welding torch outfit is indeed a useful tool, considerably more versatile than most welders realize. The welder who knows this and takes advantage of it need not have long idle spells wherein the torch does not earn its salt. Some of these uses can be turned into a profitable side line or at least to shorten dull seasons when there is no welding to do.

It is not the purpose of this article, however, to discuss all of the many uses of the oxy-acetylene torch, nor is there space available for the discussion of more than one in detail. So let us take one important item and see how to do this work, being content to merely mention other uses in the light of producing thought. Perhaps future articles can go into detailed instructions for these also.

This month we will cover the method and manner of removing carbon deposits from automobile cylinders, tractor engine cylinders, motorcycles, etc. While the recommended procedure in this does not call for the welding or cutting torch, the welding torch may be used with good results when properly handled. It does call for the employment of one of the principal constituents of the welding flame—the tank of oxygen.

The welder must always have a supply of oxygen on hand, whether he uses the welding torch or a special carbon-burning torch for removing carbon from motor cylinders. Hence he is the logical party

to take up this lucrative side line, especially if he is located in a garage or caters to the automobile trade.

At the start it may be well to impress upon the novice that he is to use oxygen



One Form of Carbon-Burning Torch.

only in this process—never acetylene. In fact, he is urged to take the acetylene hose off the torch if he uses it for burning carbon; then he will not be tempted to use the acetylene flame to start the combustion, nor will there be any danger of opening the acetylene valve by accident.

The oxygen alone is bad enough if carelessly handled but it will not burn. While it can not be ignited, it is the greatest promoter of fire; that is the fundamental of the carbon-burning process. The carbon furnishes the fuel and the oxygen maintains the combustion. The oxygen, however, should not be used under high pressure. It is injected through the spark-plug hole and brought in contact with the carbon deposit after a match or bit of burning waste ignites it. As fast as the carbon burns, the oxygen is applied. The carbon literally consumes itself.

The burning usually works in circles around the cylinder and piston head; the tip of the carbon-burning torch follows the burning. There is often considerable pyrotechnic effect, so the operator should

take some precautions to prevent fire from spreading to oily parts of the car.

He should be careful of the gasoline supply. In fact, the first thing he should do is to protect the car from fire or gasoline explosion. A simple expedient is to place sheets of asbestos paper in such a way as to prevent the sparks from having access to the greasy parts of the machinery. The carburetor especially should be guarded.

It is well to be careful where the carbon burning is done. No oil barrels, trash, or greasy waste should be located near where this work is done. It is scarcely necessary to warn against gasoline cans or tanks. A sensible precaution is to have a fire extinguisher always at hand. Instances are known where a perfectly good car has been destroyed through carelessness in carbon burning. The operator should be ever watchful!

After these precautions are taken, the regulator on the oxygen tank should be set to not over 15 pounds, after attaching the carbon-burning torch hose or arranging the welding torch for this purpose. Then start the engine, or allow it to run until it stops of its own accord, after first cutting off the gas tank supply. Be sure the engine has used all the gasoline in the carburetor and tank pipes. If the engine has a vacuum feed, drain this too. These precautions eliminate most of the danger of fire and explosion.

Next take out the spark-plug of the first cylinder. If the carbon upon it is dry and hard, it indicates that the carbon in the chamber will not burn freely but



A Home-Made Carbon-Burning Torch.

will need to be moistened with alcohol or kerosene. Only a very small quantity should be used—just a few drops injected on the wall of the chamber; we might say just sufficient to start the combustion of the dry carbon. It will do no good to increase the pressure of the oxygen when the carbon is too dry, nor is it well to inject too much kerosene because this will raise the temperature of the combustion, which may result in warping the piston or the walls of the chamber.

Ordinarily the heat of the burning carbon is less than the heat generated by the running engine and can, therefore, do no harm to the metal. If carbon is adhering to the lower walls of the cylinder, the burning process is of little avail. In this event, it will probably be necessary to re-grind the bore or fit a new piston, sometimes both.

After draining the engine of all gasoline and placing the asbestos spark-guards, the next step is to remove the spark-plug as previously stated. In the event it is not dry but is moist and oily, the operator is reasonably certain that the carbon-burning will proceed without trouble because this condition indicates the condition of the carbon in the chamber.

The engine is turned over until this piston comes up to the compression position. In other words, turn the engine until the first cylinder is on compression—until the piston is at the top of the stroke and the valve is closed. In this position, the burning should be executed.

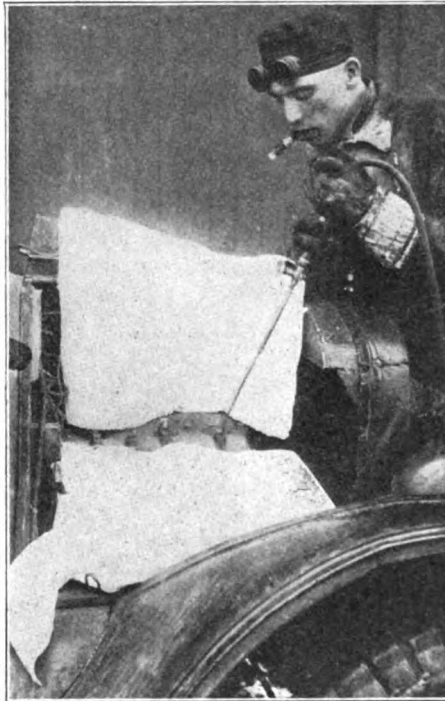
A lighted match, or a lighted bit of oily waste is dropped into the valve chamber. The tube of the torch is inserted in the spark-plug hole and the oxygen is turned on. As soon as the oxygen strikes the fire, the sparks commence to fly, accompanied by a roaring noise. If the carbon deposit is thick and not too dry, a perfect shower of sparks will issue from the spark-plug hole.

The end of the oxygen tube is briskly moved around in the chamber, following the course of the combustion as much as possible. Sometimes it is necessary to drop several lighters into the cavity during the burning process in order to be sure to remove all of the carbon, but ordinarily the carbon may all be removed in one attack. When the carbon will no longer ignite, the chamber and piston top should be bright and clean.

Next an air hose or a pair of hand bellows is used to blow out any dirt or grit that may remain after the burning. Road dust or silica is sometimes found in the cylinders. The oxygen will have no effect on this or other non-combustibles that may have been drawn into the cylinder. Such material must be blown out after the burning is finished. Then the valve, seats, and piston top are swabbed clean with kerosene; the spark-plug is replaced and the engine made ready for the next cylinder.

The second cylinder piston is moved upward to bring it on compression the same as was the first. The spark-plug is taken out and the burning process is repeated in this cylinder about the same as the first, without disturbing the asbestos protectors.

If considerable flame issues with the flying sparks, the oxygen pressure is decreased; this holds good for any of the cylinders treated. All of the cylinders are treated practically the same, one after the



With Asbestos Protection in Place, Insert Tube in Spark-Plug Hole.

other; the spark-plugs of one being replaced before attacking another.

This process of removing carbon is probably the easiest when a special torch, such as shown in the accompanying illustrations, is used. But the welder can braze a piece of copper tubing to a worn-out welding torch tip and it will serve as a carbon torch. This tubing should be 12 or 14 inches long and should be pinched nearly shut at the end to make an outlet that will concentrate the oxygen to a fine stream. Sometimes it is necessary to bend the end of the tube back in order to reach all of the carbon in the cylinder.

This arrangement is rather awkward to handle and is not recommended unless the welder knows he will have but little carbon burning to do. A factory-made carbon torch is really inexpensive and, besides, there are other types of home-made devices that can be constructed quite cheaply so there is no real need to use the welding torch.

Any small globe or needle valve, to which can be brazed a section of small copper tubing, will serve as a carbon burner better than a regulation welding torch. Soft copper tubing is better because it can be bent quite easily to different angles without splitting or breaking.

Now a few words of caution in regards to the manipulation of carbon torches in general, and particularly in regard to the oxygen. The oxygen tank valve should not be opened all the time but should be kept closed until just about ready to burn out a set of cylinders; nor should the torch valve be opened before inserting it into the valve chamber. Either of these practices is wasteful, due to the ease with which oxygen leaks, on account of its high pressure, and to the rapidity with which it escapes.

The torch valve should be closed before withdrawing the tube from the spark-plug hole; the tank valve should be closed the moment the burning job is finished.

These things are in the interest of economy, but there is another side to the story. Oxygen will not burn alone but it will turn a tiny blaze into a fierce fire in a moment, almost. If the welder swings the torch around without closing the valve, the oxygen pressure is liable to strike a tiny spark on his clothing and set him afire before he can extinguish it. Again, he is liable to cause trouble if he lays the torch aside without shutting off the tank valve. Oxygen, under certain conditions, coming in contact with oil or grease, is liable to cause an explosion.

That is why you do not see any grease or oil on any of the valves or regulator connections of an oxygen tank; that is why we are continually cautioned by the manufacturers' printed instructions, or those stamped on the valves and regulators, to keep oil away from the oxygen tank.

Oxygen, under certain pressure and velocity, upon coming in contact with oil of any kind, has been known to cause a violent explosion. All of which does not mean that the carbon-burning process is a dangerous piece of business. Quite the contrary—it is harmless, indeed, if the operator is careful. That is why he is cautioned here again—so he will be careful. It costs so little to be careful—just the twist of a thumb and finger on a valve to keep the pressure flowing while we use it and to shut it off when not using it. You've heard of accidents due to carelessness, but did you ever hear of one due to carefulness?

When the welder stops to figure the immense number of cars in the country and multiplies it by the number of cylinders to the engine, he can grasp the significance of how important carbon burning is when summing up the uses for the torch aside from welding and brazing. However, a great deal of this trade needs educating.

The welding torch may be used for soldering, either by itself or in connection with the common practice of employing soldering iron. In the first instance, the smallest size tip is used on low regulator pressure, utilizing a long, thin flame; good on many kinds of radiator leaks. In the

(Concluded on page 26.)

Legal Rulings of Interest to Garagemen

Dealing With Liability in Case of Negligent Driving—Responsibility in Case of Trespasser—Conditional Sale Contract Renders Theft Policy Void—Court Rules Illinois Garage Lien Act Void as Giving Garage Keepers Advantages

By R. R. Rossing

Liability for Excessive Speed of Automobile.

Evidence that a defendant's automobile was being operated on a city street at a speed of 20 miles an hour, when a collision occurred, warranted the jury in finding that he was operating the car negligently as a matter of fact and guilty of negligence per se as a matter of law under Vernon's Ann. Pen. Code Supp. 1918, arts. 820a-820yy.

A verdict of \$1,900 for diminished earning capacity was held not to be excessive where the plaintiff, knocked down by an automobile, broke his collar bone and shoulder blade and sustained injuries to his back, arm, hips, and knee, and injured his hearing, and had been unable to accept a position for which he was in line when injured, although his salary had been increased subsequent to the injury.—*Flores vs. Garcia* Court of Civil Appeals of Texas, 226 Southwestern 743.

Negligent Driving of a Motor Vehicle.

The driver of 12-foot truck, who drove out from a curb, crosswise of a narrow street, without sounding his horn, signaling with his arm, or giving other warning, in violation of ordinances requiring such warning and requiring vehicle to keep as near curb as possible, and who caused other automobile to swerve to the left and to strike a third automobile on the other side of street, was negligent and rendered his employer liable for the damage to the third automobile.

Where a driver of an automobile with brakes in good condition swerved from her path to avoid striking another automobile which had been driven out from the curb in front of her automobile without warning, her failure to stop her automobile before it struck a third automobile standing alongside of curb on other side of street, a distance of at least 20 feet, was negligence.—*Anderson vs. McLaren*. Supreme Court of Washington. 194 Pacific 828.

Care Required of an Automobile Driver.

The duty of an automobile driver approaching a crossing with the view of the track obstructed, is to look and listen before going on the track, and as soon as seeing and hearing are reasonably possible, to keep a lookout from there on such as an ordinarily cautious person would, but for some sufficient diversion of his attention; to have his machine under such control that on discovering a train he, acting as a person

of ordinary skill and prudence, can stop in time; to determine, acting as a person of ordinary care, on discovering a train, whether he can safely pass or should wait—all this, regardless of the train running at excessive speed and without signal.

The driver of an automobile struck at a dangerous crossing, with which he was familiar, by a train approaching at excessive speed and without a warning signal, was held guilty of contributory negligence, as a matter of law, in not observing after passing structures obstruct-

Every man who enters our employ is an investment. If he fails to grow, to advance, he is a bad investment, and we are the losers. My men develop themselves. I give them a free rope and a long one. If they are too small for their jobs, they get tangled up in the rope and it trips them. If they are too big, they fashion the rope into a ladder and climb higher. Big men are only little men given a fair chance to grow.—J. Ogden Armour.

ing his view, or in not having his machine under control, or in taking a chance of crossing ahead of the train.—*Corbett vs. Hines*. Supreme Court of Iowa. 180 Northwestern 690.

Injuries Due to Negligence Caused by Sitting at Curb in Street.

A plaintiff, suing for injuries from being struck by an automobile, was sitting in a chair in the edge of the street with his feet on the curb, and did not move out of the roadway when he saw the automobile approaching. It was held that he was guilty of contributory negligence.—*Scott vs. Dounson*. Supreme Court of Louisiana. 86 Southern 821.

Transfer to Creditor of Stolen Automobile.

An alleged bankrupt transferred to a creditor an automobile which he had bought in good faith, and to which he had added accessories for which he paid.

It was held to be a transfer of property and an "act of bankruptcy" within the meaning of Bankruptcy Act, sections 3a(2), Comp. St. section 9587, although the automobile had been stolen and the legal title was not acquired.—*In re Schenderlein*. U. S. District Court, Massachusetts. 268 Federal 1018.

Injury to Trespasser on a Motor Truck.

A boy assisting the driver and permitted to ride on a motor truck by the unauthorized invitation of the driver was held a trespasser. On discovery of a trespasser in a position of peril, ordinary care must be exercised to avoid injuring him.

Where a boy, riding on a truck by the unauthorized invitation of the driver, was ordered by the driver to ride on the running board to facilitate the operation of the truck, the employer was liable for injuries to the boy thrown from truck if they were caused by the driver's negligence, though the boy was a trespasser.—*Kalmich vs. White*. Supreme Court of Errors of Connecticut. 111 Atlantic 845.

Theft Policy Void for Incorrect Statement of Ownership.

On account of a conditional sale contract a man was not the sole and unconditional owner of his automobile when he took out thereon a theft policy, expressly stating as a condition that it should be null and void if the interest of assured was other than unconditional and sole ownership.

It was held that the contract did not become binding on the parties, and the plaintiff could not recover for a loss, despite Massachusetts' statutes of 1907, chapter 576, section 21, which provides that no misrepresentation or warranties shall prevent the policy attaching, unless made with actual intent to deceive, etc., which is not applicable to an unperformed condition precedent to the policy becoming effective.—*Ballard vs. Globe & Rutgers Fire Ins. Co. of New York*. Supreme Judicial Court of Massachusetts. 129 Northeastern 290.

Illinois Garage Lien Act Held to Be Void.

The Illinois garage lien act, sections 3a-3d, attempting to authorize a garage keeper to enforce his lien for storage charges on a car, which accrued after a chattel mortgage thereon given by the owner was filed for record as a prior lien to that of the mortgage, is void under Const. art. 4, section 22. The court thus ruled, holding the act to be special legislation giving garage keepers superior rights and advantages in respect to their liens on cars and foreclosure thereof, over other classes and persons similarly situated.—*Jenson vs. Wilton E. Wilcox Lumber Co.*, Supreme Court of Illinois. 129 Northeastern 133.

Glimpses in the Garageman's World

An Interesting Garage Interior—Unique Idea of Iowa Garageman Brings in Dollars During Dull Season—How San Francisco Meets the Problem of "Blind" Cross-Street Intersections by the Use of Mirrors Suitably Placed

Novel Features of One Garage.

A number of novel features are shown in the accompanying illustration of the interior of a garage. One is the overhead skylight *B*, which extends entirely along the rear of the building over the workbenches to give light to this section of the room. The garage is built along the side of a hill and it was impossible to have windows in the wall, so the section occupied by the workbenches was extended about six feet beyond the line of the building and a skylight extended from the rear of the building to the rear wall—in other words, from the point shown by *S* to the point shown by *R*.

A vent for taking off fumes and smoke from the exhaust of engines is shown at *A*. It is 55 feet in height and about 2 feet by 5 feet. A flexible hose, *Q*, extending from the lower end of the vent at *C*, and provided with bushings on one end which fit over the pipe on the end of the muffler of the automobiles, conducts the fumes from the muffler to the vent. There is a thumbscrew on the end of the bushing to tighten the bushing on the muffler.

The benches are covered with steel plates $\frac{1}{8}$ th inch in thickness. By this arrangement, the workmen can strike the



Dahmen's School-Wagon and Some of His Passengers.

At *E* is shown a special wooden floor placed in front of the workbenches for the men to stand on while working. This does not fatigue the workmen like a concrete floor.

Creating Business in Dull Times.

How to make the garage pay through the winter and early spring is considerable of a problem in the small midwest towns where, for lack of paved streets and roads, automobile traffic takes a big slump from November to April.

G. H. Dahmen, proprietor of the Scenic Highway Garage, at Marquette, Iowa, has picked up some welcome dollars the past winter by running a private school-wagon on his own initiative. The school motor bus is used in a good many agricultural communities where consolidated schools have been built, but the busses are owned by the school district and carry the pupils without expense to them.

The high-school pupils of Marquette go to McGregor a mile away to attend high-school. It is all right walking in nice weather but pretty disagreeable in cold and muddy weather. Mr. Dahmen has a motor bus which he runs as a taxi between the two towns. He conceived the idea of making it a school bus for the winter to help out on upkeep while taxi business was slow.

He advertised that he would carry any children who wanted to ride to school, at 15 cents each a day, the money for each week to be paid in advance on Monday morning. He soon had as many applicants as the bus could hold, and he has kept his liberal patronage throughout the entire season and on into the spring. As he picked up the children all at one place

and received them in a body at the school, he found there was good money in it for the time spent and the wear on the bus.

Mirrors at Blind Corners Aid Traffic.

A mirror, about five feet in length, is being tried out by the experimental department of the California State Automobile Association in San Francisco as an aid to traffic. The idea consists in placing

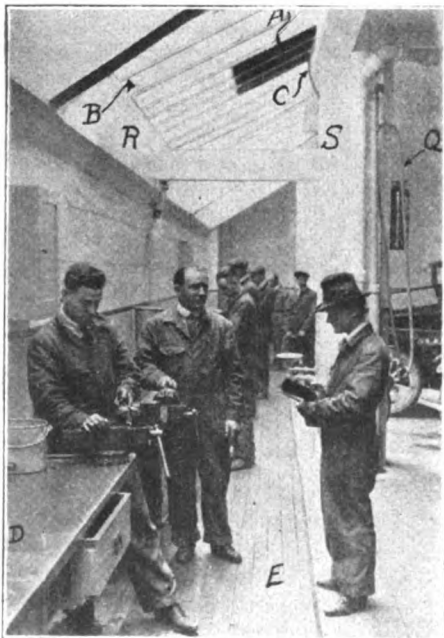


Mirrors An Aid to Collision Prevention.

such mirrors at the intersections of so-called "blind" cross-streets.

The mirror shown in the illustration is fastened to a pole at the southwest corner of Post and Steiner streets in San Francisco, one of the busiest and most dangerous street intersections in the city.

A motorist, driving west on Post street, is enabled, as a result of the mirror, to see around the right-hand corner of Steiner street for a considerable distance—far enough to see approaching vehicles, in plenty of time to avoid a collision. Vehicles traveling south can also see vehicles coming toward the intersection.



Some New and "Different" Garage Features.

benches as hard as they please with hammers without denting them. This also makes it possible to keep the benches perfectly clean, and they will last indefinitely. The real purpose of the covering, of course, is the reduction of the fire hazard.

Did You Ever Try Growing Pistons?

Some Folks Grow Corn and Wheat for Profit—Harry Lane Grows Pistons and Finds It a Profitable Business Also—Customers Like the Home-Grown Pistons—Harry Shows How It is Done and Wins Wager Made by Competitor

By J. N. Bagley

Growing pistons for automobiles and gas engines is something that very few garagemen know anything about—yet it can be done very successfully, as well as profitably, for both garageman and car user.

Some few months ago, while making a tour in the western part of the state, I had the misfortune to have a case of engine trouble that could not be repaired on the road, and it was necessary to haul the car in for repair a distance of about seven miles to the nearest garage—in fact, the only garage within a radius of 30 miles. So there was not much choice. When I was towed into the little village of about a dozen residences and a store, I began to doubt that a good mechanic would be found in a place so small.

We came to a halt in front of a small garage about 20 by 40 or 50 feet, built entirely of rough lumber. The owner came out and looked the engine over and advised me that the crankshaft was broken and that it would be necessary to take the engine down in order to place a new one.

Somewhat surprised to find he carried the crankshaft in stock, I was even more surprised when I went into his small but complete workshop. There was as fine a lot of tools as any one cared to see, and I was soon thoroughly convinced that he knew well how to handle them.

The engine was taken down and the old shaft removed, and when the pistons were taken out we found one of them broken beyond repair. Harry, as everyone called him, said that he did not have a single piston in the house that would fit my car, but that he had a few old ones and we might get one out of the lot that would work very well. I examined the pile carefully and they were all so worn that they would not fit the cylinder by quite a little. Harry looked the lot over the second time and selected one that he said would work.

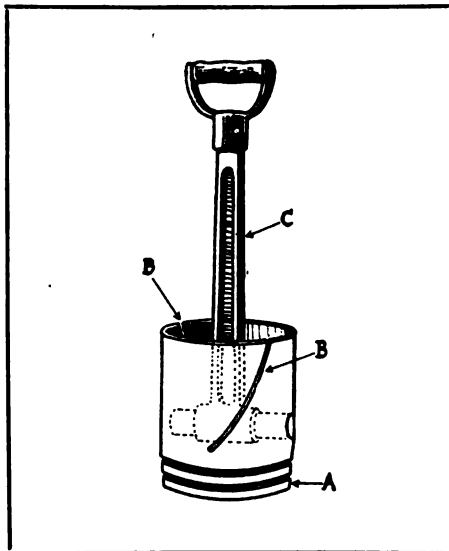
I asked him how he figured it would work when it was so loose and the remaining ones fitted so closely in the cylinders. "That's easy," he remarked smiling. "I'll just grow it until it will fit, then lap it in, and it will be just as good as new." "Grow it, grow it," I thought, "what is this growing business that he is talking about?"

My curiosity was aroused, but I didn't ask questions. I just watched that piston to see it grow, and by the time Harry had finished, it had surely grown.

He packed it full of moulding sand and placed it in the fire and heated it gently for some time, keeping it well covered all

the while with cinders, etc. After it was thoroughly heated to nearly a cherry red, he removed it from the fire and placed it in a little box which contained air-slacked lime and left it to cool gradually. He then set about putting in the new shaft and fitting the bearings. In the course of a few hours the job was finished and he was ready for the piston.

He got down his calipers and measured



Preparing An Old Piston for Use.

the inside diameter of the cylinder and then measured the piston. To my surprise, it had grown so it would not go into the cylinder. He then placed it in the lathe and machined it to a very tight fit. I thought to myself, "It will never work, as tight as he has it." Again he used his micrometer and remarked: "That will just lap in fine."

"Lap in," I thought. "There he goes again. I'll just stick around and find out something about this lapping business he talks so much about," and so I did. The process from "growing" to "lapping" was so interesting that I want to tell you about it, for it is something that every garageman should know. My car ran as smoothly as when new—and it is still running that way.

The following, as nearly as I can remember, is about the way that Harry lapped in the piston to get it to fit the cylinder as it should. He afterwards told me that he always lapped new pistons in when placing them, as it was the only way to get a first-class job. The only tools he used are those mentioned and these he made in the shop.

After the piston has been "grown" it

must be turned down to size. In spite of the great degree of accuracy attained by the modern lathe or grinding machine, it is almost impossible to turn either cylinders or pistons and have them perfectly true after they are taken from the machine. Therefore, Harry claims it is necessary to lap the piston in, regardless of how perfectly it seems to fit the cylinder.

In most cases the cylinder casting itself is so intricate, and the expansion and contraction depend on so many little things, that every cylinder may be a little out of true. This is especially noticeable in re-boring a cylinder on a lathe, in case the cutting tool is a trifle dull.

When the tool passes by a thin place in the wall, the metal will spring away from the tool and after making the run through the cylinder, it will be noticed that, in calipering it in different places, it will vary from 1/100th to 1/1,000th of an inch. To overcome this irregularity, the lapping process comes in very nicely to make the job 100 per cent good.

"Grown" cylinders are, as a rule, more true than those that are bored with boring machines, but even they show quite a little irregularity in measuring them up very carefully. Now the average piston, being simple in design, can be turned more nearly true, but this does not help matters a great deal, for placing a perfect piston in a cylinder that is not true does not make a good combination. Of course, a piston placed in a cylinder which is out of true will finally run in until it fits the walls very well, but in so doing, it must wear the rings to fit the walls of the cylinder.

Pistons should be "grown" in just as in grinding valves. It is an art that should be practiced in all repair shops if best results are to be expected from the overhaul jobs. To begin with, we must take into consideration the fact that a certain amount of metal is going to be removed from both cylinder and piston by means of the grinding compound employed.

Now then, if we were to take the new piston and attempt to lap it directly into the cylinder, be it new or old, so great an amount of metal would be removed from the piston and cylinder that the piston would be improperly fitted. Therefore, the proper method to follow in lapping is to lap first with the old piston before attempting to use the new one.

This old piston can be especially prepared for the purpose by truing it up in the lathe. I might mention here that old

pistons should be kept for just this purpose.

To prepare the old piston for use, turn it down at the top end just a trifle as shown at *A* in the illustration, and with a hack-saw slip, as shown at *B*, insert an old connecting-rod, as shown at *C*, with a steel handle from a shovel attached to it for a handhold. The piston will now be a little under size at the end, to allow starting, and the skirt wall will spring as the slots, *B*, will allow it to contract as it enters. This keeps the metal compressed tightly while lapping.

By inserting a thin coating of fine grinding compound between the piston and the walls of the cylinder, we are ready for the grinding, or lapping as it is more commonly termed. The motion of the lap is of most importance at this time, and a good job depends largely on the skill of the person doing the work. Now place the cylinder in such shape that it will be solid and not shake while proceeding with the work. This piston should not be drawn back and forth, except as it is turned first one way and then the other, or there will be small grooves cut in the walls of the cylinder.

The amount of swing should vary at each stroke up and down; that is, the path should not be retraced the second time. Neither should the swinging motion be back and forth but instead it should be continually in the same direction. Besides the piston described for lapping, a very good plan is to take a piston and split it full length and remove a sufficient amount of the wrist-pin boss to permit of a spring being slipped over the wrist-pin on either side, bearing against the rod which is attached to the pin acting as a handle or lever.

This plan will be found a very good one, for a piston can be used if the diameter is not nearly the same size, as the springs will hold the two halves out against the walls of the cylinder until the cylinder walls have been reduced sufficiently to start the fitting of the new piston.

As the process of lapping goes on, the inside diameter of the cylinder should be measured from time to time with a micrometer to prevent its being ground out too much, for a good grinding compound cuts quite rapidly; in fact, much faster than one would naturally suppose.

Remove the lapping piston from the cylinder frequently and clean the walls of the cylinder carefully with kerosene, noting whether or not the grinding has been over the entire surface or whether on two sides, top and bottom. After long use, a cylinder will not be the same size at the top as at the bottom, and some little care should be exercised in this case, in caliper-ing, to get the bore of the cylinder straight.

The lapping with the old piston should be continued until the new piston will just enter by forcing it slightly. We have now reached a stage where, if absolute accuracy is required, we should fill the

water jacket with hot water and keep it at about a certain temperature during the final lapping process, or during the fitting of the piston that is intended for use in the cylinder.

This hot water is not necessary to get a very good job, but, as few cylinders expand equally at all points, a more perfect job can be had by heating the cylinder during the final lapping. The clearance for cast-iron pistons varies from 0.001 to 0.003 inch, depending, of course, upon conditions and sizes of pistons, as well as the bore of the cylinder. The greater the bore, the greater the clearance that will be required.

After the lapping is finished, both cylinders and pistons must be washed thoroughly with kerosene, and great care taken to remove every single particle of the grinding compound that may be clinging in the grooves. It is not necessary to lap in the rings as they will soon adjust themselves to the walls of the cylinders.

The grinding compound for lapping in the pistons should not be overly coarse unless the cylinder is in very bad shape. Ordinarily, the grit that is used for finishing the valves is about right. This can either be made up or it can be purchased already prepared; the latter, however, being the better plan.

Some weeks ago a certain competitor of Harry Lane was talking to one of his customers, and remarked that lapping pistons was a makeshift way of doing the job and that growing pistons could not be done successfully. A wager was made between Harry's customer and his competitor. Harry was to take a certain engine that had been used for some time and grow the pistons, lap them, fit new rings, and have an engine which would run as quietly as new, or practically so.

The job was taken to him and some one slipped him the tip that he should do his best. Harry said nothing but went to work, and in the course of a week or ten days he turned the job out for the judges to decide. Harry had only worked at the job during odd moments and evenings when the judges, or at least one of them, could be on the job to see that no new pistons or new cylinders were used. He was allowed a new set of rings, his own selection.

The job was finished and turned over to the judges to try out as they saw fit. It was tested in the yard and ran quietly and throttled down well, after which it was taken out on the road and driven about 1½ miles and back to the shop. The judges decided in favor of Harry, and his customer won the money.

Quite a little crowd had gathered to witness the demonstration and, when the general buzz had settled down, one of the crowd wanted to know what kind of rings he put in.

"I am going to put in just plain everyday rings as soon as I get a little time. There are none at all in it at the present

time," Harry answered. He could not make a man in the crowd believe it until the pistons were removed, one by one, and laid out for inspection.

This only went to prove that pistons can be fitted perfectly by the lapping in process, and it also proved that pistons can be successfully "grewed" for profit. Hardly a week goes by that Harry does not grow a piston for some job; in fact, he has his territory pretty well filled with "home-grown pistons."

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 22.)

second case, the welding flame is used to heat the soldering iron and keep it hot during the soldering process.

Then the welding torch is useful in re-babbiting motor bearings. With it the old bearing is quickly and easily melted out, and by the same action the bearing is cleaned and dried in preparation for new babbitt. This is easily melted in the babbitt ladle in a very few minutes with the welding flame. The ladle is heated red hot and then the babbitt is melted into it with the torch flame.

The welding torch is also very convenient for straightening twisted or bent automobile parts, such as axle housing, connecting-rods, etc. The flame is played over the distorted portions to raise the heat to almost any desired condition, so the thing can be straightened easily with a hammer or in a vise. This is much easier than trying to heat the parts in a forge.

Another use of the torch, aside from the purpose for which it was originally intended, is for tempering tools and hardening wearing surfaces. In tempering tools, of course, the welder should know something about temperature and tempering colors. These are very accurately achieved with a welding flame because it is under such good control and may be applied just when and where it is needed.

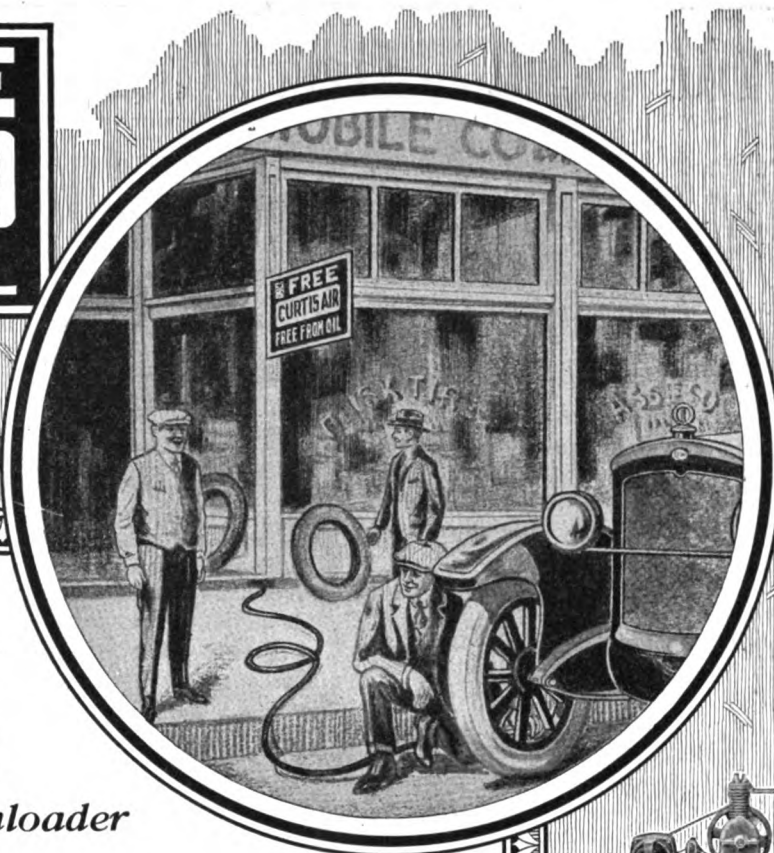
When hardening the wearing surfaces of steel parts, the operator brings them to a bright orange heat and then turns the oxygen off entirely. The pure acetylene flame is sprayed over the heated surface as it slowly cools. The acetylene, which is rich in carbon, supplies this substance to the steel where it is absorbed to carbonize or harden the wearing part.

These are but a few of the numerous uses for the oxy-acetylene process which have nothing to do with the mending of broken parts by fusion welding.

The operator must let it be known that he is in a position to remove carbon from engine cylinders; and can do it easily and thoroughly. If he advertises rightly, he can build up a paying side line to his repair business. The best of it is that his customers are likely to come back—again and again—because the burning out of carbon once does not prevent it from collecting again.



The Curtis Sign is 10x14 inches—baked enamel on steel. Furnished FREE with every Curtis Garage Air Compressor—cannot be had in any other way.



Starts Against No Load

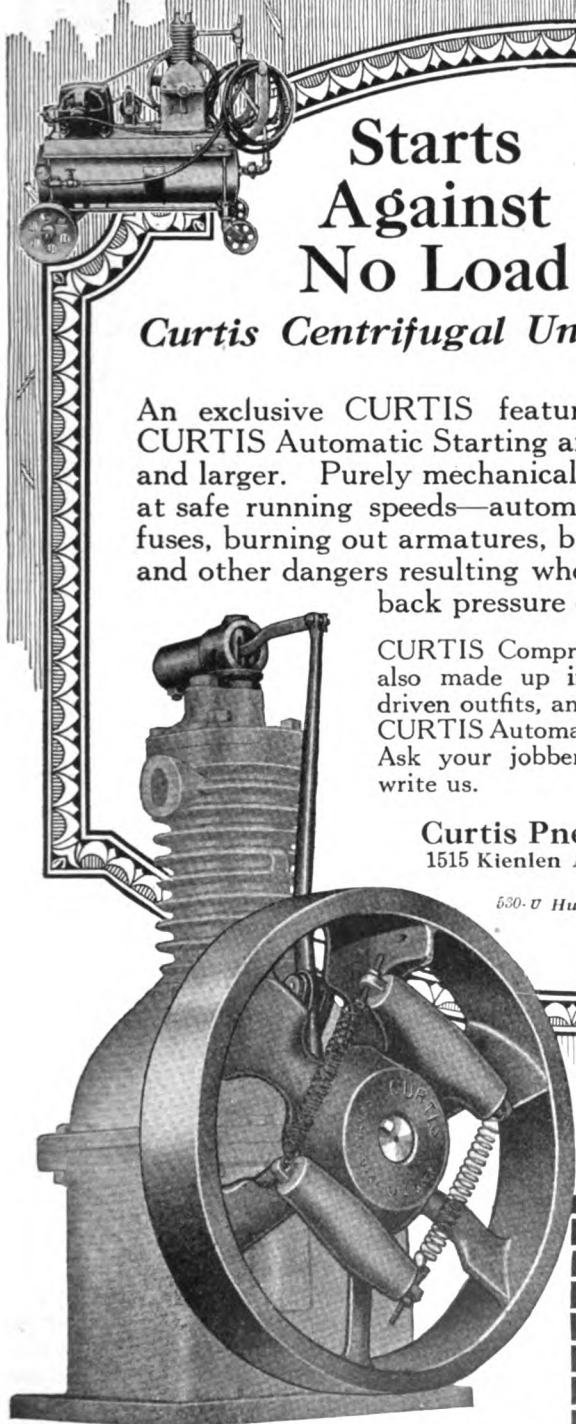
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An exclusive CURTIS feature that is incorporated in all CURTIS Automatic Starting and Stopping Devices of $\frac{1}{2}$ H. P. and larger. Purely mechanical—load never thrown on except at safe running speeds—automatically guards against blowing fuses, burning out armatures, burning up belts, stripping gears and other dangers resulting when motor is started against the back pressure of the air load.

CURTIS Compressors are furnished in five sizes, also made up in stationary and portable motor driven outfits, any of which can be furnished with CURTIS Automatic Starting and Stopping Devices. Ask your jobber for prices and particulars, or write us.

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Send me particulars on the Centrifugal Unloader, also full information and prices on Curtis Air Compressors.

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Practical Hints for Shop Mechanics

Removing Sediment from Gasolene.

A simple yet effective way of removing sediment from gasolene as well as oil strainers, is to use an ordinary tire pump. A few quick, sharp strokes from outside of the strainer is usually sufficient unless the strainer is very badly fouled.—R. C. S., Tenn.

* * *

Reviving Dry Cells.

It is possible to get increased amperage from partly rundown dry cells by crowding down the materials near the carbon element with a small piece of wood or a hammer handle.

This lessens the obstructing material from around the carbon and permits free chemical action. The asphaltum on top of the cell may be sealed again by application of a little heat.—S. T., Miss.

* * *

Removing Bushing.

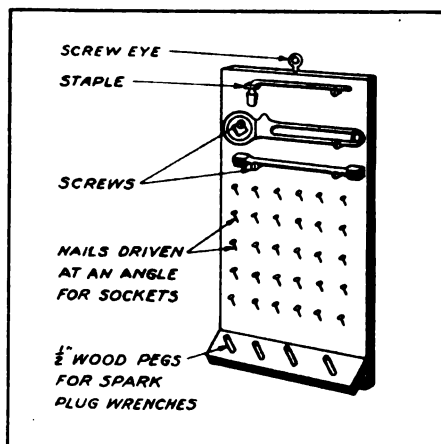
A very handy spring bushing remover can be made from an old spring bolt. Take the old spring bolt and turn the head down in a lathe or grind it down on an emery wheel until the diameter is slightly less than the outside diameter of the bushing, and use it to drive the bushing out.

It also can be used for driving bushings in by inserting the bolt end and pounding the head.—L. A. M., Mass.

* * *

Holder for Socket Sets.

To make a convenient holder to take the place of the regular socket-set box, take a board about 8 inches wide by $\frac{3}{4}$



Board Arrangement for Holding Socket Wrenches.

inch thick, long enough to handle the number of sockets in your set, and place nails $1\frac{1}{4}$ inches apart each way, but use $\frac{1}{2}$ -inch wood plugs to hold spark-plug wrenches. Make a staple for the "L" wrench and use screws for the ratchet wrench and extension.

Put a screw eye in the top of the

ONE DOLLAR EACH!

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

board for hanging it on the wall or in the tool cupboard.

Hang sockets on the nails with the hexagon end out and you will find this board more convenient than scratching through the box to find a socket.—J. M. C., Pa.

* * *

In Drilling.

Kerosene should be used in drilling, reaming, or turning malleable iron or aluminum.

On the other hand, turpentine should be used instead of oil for drilling hard steel as it will enable rapid drilling of the metal.—P. B., Mich.

* * *

Cleaning Valves for Grinding.

In cleaning valves for grinding we use a steel wire brush on the shaft opposite the emery wheel.

This brush will give better service if it is run at a speed of about 3,500 revolutions a minute. Such a brush can also be used for cleaning removable cylinder heads, head gaskets, and spring leaves.—E. W. S., Ill.

* * *

For Cracked Distribution Head.

Here is a stunt I have found to work every time: If a car comes in a-missing and is hard to start on damp or cold mornings and battery ignition and everything seem all O. K., look to the distributor head.

You will find it cracked or short-circuited; more so if an anti-freeze mixture has been used in the radiator. Take some paraffine wax and boil it; then dip the head in it. It will then work like new.—L. W. J., N. D.

* * *

Assembling Ford Rear Axle.

This hint is also an answer to the question asked in the March issue by H. B., Pa., regarding the assembly of the Ford rear axle; to know when assembling a

Ford rear axle whether or not you are getting the proper position of the pinion gear with the ring gear.

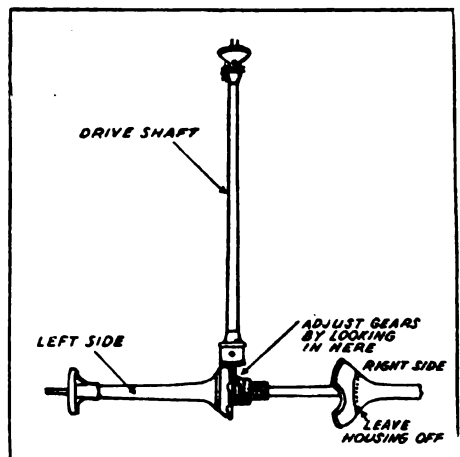
First, it is absolutely necessary to have a rear axle stand.

Second, fasten the left axle housing in the stand with the differential assembled with the axle shafts, roller bearings and thrust plates. Slip in housing so that the ring gear is next to the housing and force up tight against the thrust plates. In this position, with the studs in the axle housing standing straight up, put on the drive-shaft housing with the driveshaft and pinion. Tighten up the studs of the drive-shaft housing just enough to seat the housing to the axle housing.

In this position, you can see just what you need. Using this method I have never had to do the same job twice.—G. H. M., Ga.

In the AMERICAN GARAGE & AUTO DEALER for March, the question was asked how to assemble a Ford rear end and not have a grinding noise. Now I have a suggestion.

First assemble the running gear, axles, etc. Put the bearings on the axles. Then put the axles and differential into the left-



Method of Assembling to Detect Grinding.

hand housing, leaving the right-hand housing off.

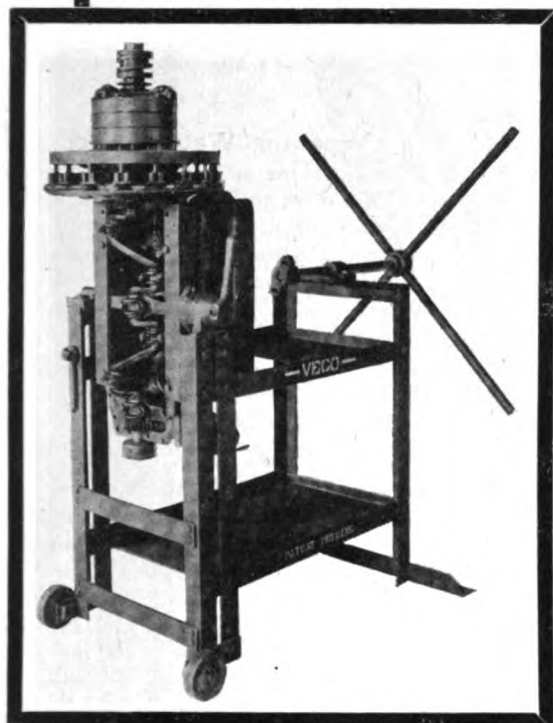
Next assemble the drive-shaft and put it on the three housing bolts and bolt it fast. You can then see if the gears are meshing too deep, and if the drive pinion is right-end-ways. If it goes in too far, you can make some shims of brass and shim it out until it meshes right.

I see in another drawing where a suggestion was made in regard to threading a Ford camshaft.

I suggest that, instead of turning the die-stock 90 degrees at a time, you get your die started, take hold of the crank and turn the motor. As the camshaft turns anti-clockwise, it will thread itself.—J. H. S., Pa.

VECO

Make your Ford Motor Overhauling Jobs show Bigger Profits with the "VECO"



THE VECO MOTOR OVERHAULING STAND

is an adjustable motor work bench, a bearing fitting machine and a connecting rod aligning jig, all combined in a substantially constructed unit that takes up but little room in the shop. It is portable, yet rigid.

The VECO is the only Ford Motor Stand which permits quick shifting of the motor from one position to another. The VECO is equipped with a specially devised handle lock that can be operated with one hand, leaving the other free to swing the motor to the desired position.

FOR BEARING WORK—

With the Veco perfect bearing work is done in record time. For fitting bearings the clutch on the hand wheel shaft is slid into engagement with the flange on the crank shaft. A socket is cast in the face of the clutch for driving a bearing reamer if you use one. The long handles give plenty of leverage for reaming bearings or for turning the shaft with the bearing caps bolted down tight.

The VECO will enable your men to do **BETTER** work, **MORE** work and make you **MORE** profit on every job.

OTHER VECO DEVICES

The VECO Rear Axle Overhauling Stand

With this rear axle stand you can handle any rear axle job for the Ford, Maxwell, Chevrolet and all other cars having divided rear axle housings. The VECO Rear Axle Stand is so constructed that the rear axle housing is held by one-half only, allowing the other half to be removed and axles and differential assembly drawn out in the least possible time. The vise or clamp jaws are so constructed that all that is necessary to do to hold rear construction in horizontal position is to screw hand wheel tight. Simply loosen hand wheel and shift rear construction in any desired position and tighten—it is held firmly in place. This machine always pays dividends.

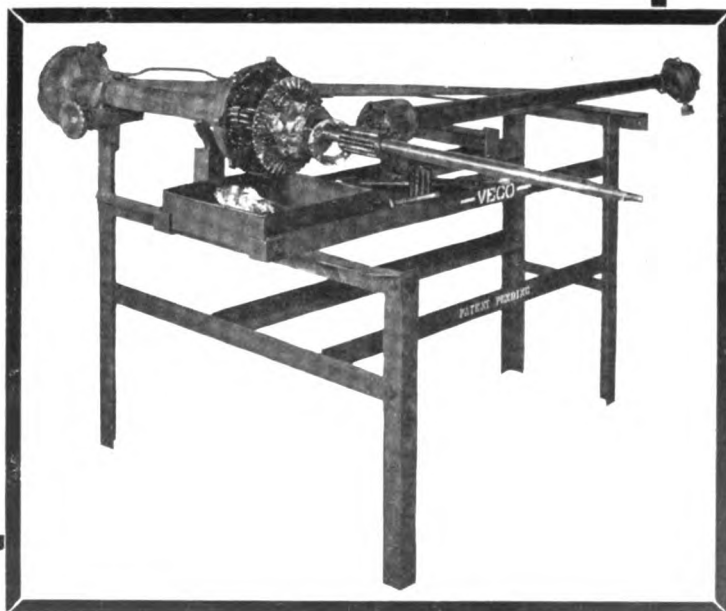
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All VECO equipment is sold under an iron-clad guarantee. Every machine is constructed of the very best material to be had and is made by skilled mechanics. Every VECO Machine **MUST** measure up to our standard.

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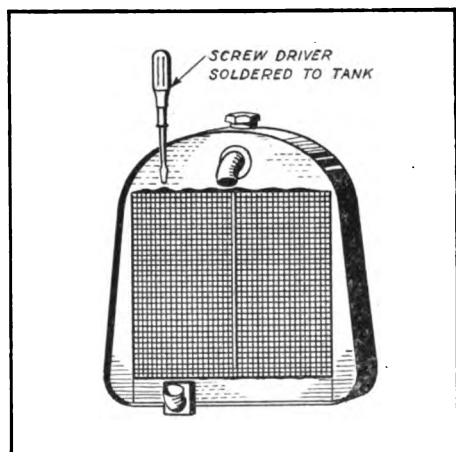
VAN TRUMP-ESELBEY Co.
1918 Cherry St. Philadelphia, Pa.



Kink for Soldering Radiators.

When soldering radiators, upper or lower compartments, that have bursted through freezing or by steam exploding, a screw driver is of great assistance.

A radiator had exploded, breaking the seam the whole way across the inner, lower



Screwdriver An Aid in Soldering Radiator.

seam of the upper part. Not wishing to remove the top, which had pushed out, I pushed it back.

There were, therefore, places that were too far in to solder. I took a large screw driver, tinned it and soldered it to the places that were pushed too far and then drew them out to place. While holding them in place, I took a soldering copper and made the part fast. As a result, the job was as neat as though the top had been removed and straightened.—P. R. D., Ill.

* * *

Remedy for Loss in Engine Power.

If you have been having trouble with the engine of a car overheating and losing power, the following suggestion may help:

Occasionally the nut on the joint in the distributor control arm becomes loose. If this is loose, the unit will turn only three-quarters around part of the time. Then the spark and gasoline charge will not meet in the cylinders as they should, and the motor loses power at once, and because of the loss it overheats.—R. A. F., Minn.

* * *

Dry Bearings.

One cause of insufficient lubrication in the bearings is found in obstructions in the grooves in the bearing holder.

Sediment often collects in these grooves so that they cannot perform their appointed function of carrying lubricating oil to the bearing surfaces. An excess of graphite, if that be used with the oil, sometimes produces this condition.—K. R., Mont.

* * *

Preventing Rusting of Fenders.

It is not uncommon to observe automobile fenders through which holes have rusted and which are loose at the fastenings. To prevent this and to give the fenders longer life, wash the mud and

dirt from under them frequently; then rub a good supply of oil over the inside of the fender, which will prevent further rusting and preserve the fender from further abuse.

A good graphite paint is also a very fine preservative. The most important thing is to prevent the daily accumulation of mud, under which rust soon forms, loosening the fenders and causing them to rattle.—C. H. T., Pa.

* * *

Putting in a Ford Rear End.

A very good way to put in a Ford rear end is to pack the universal joint full of cup grease. That will keep it in place and it will stay in any position desired. One man can then put in an assembly.—R. W. T., Ohio.

* * *

To Find a Small Tire Leak.

Here is a very satisfactory way of finding a small leak in a tube when it is necessary to immerse it in water to find the leak: For those who have no equipment to do this work, it can be done by placing a piece of paper over the drain in an ordinary kitchen sink and then fill the sink with water.—F. W. D., Ohio.

* * *

Home-Made Socket Wrench.

Sometimes a socket wrench is needed to reach an out-of-the-way place on some machine. If the nut is fairly small, an old Ford piston pin will make a dandy strong one, and an old connecting-rod can be used for the holder.

Heat the pin white hot. If it will not slip over the nut, spread the hole by driving a punch in it. Then slip it over the nut and hammer to a fit.—P. W. C., Fla.

* * *

Seized Spark-Plugs.

When a spark-plug has been screwed in too tightly and has then rusted, it is very hard to remove. Here is a method of doing it:

Build a shallow dam of putty around the top of the plug and then fill it with kerosene. Let the kerosene soak in for 12 hours and it will loosen the rust so that the plug can be unscrewed.—B. W., Ill.

For Sticking Valves.

It is very annoying to garagemen, who supply "free air" and do not have an "outside" man, to have a customer say, "No air!" when probably the trouble is not in the amount of air pressure you have but is due to a stuck tire valve.

It is a very simple and easy matter to take a valve cap or nut and press the valve stem until a bit of air is released, thereby avoiding any possibility of stuck valves and saving time and temper.—R. C. S., Tenn.

* * *

Repairing Water Jacket.

The following is a simple way of repairing a crack in the water jacket or any cast-iron part of a similar nature: Dissolve some bluestone, copper sulphate, in water. Clean the edges of the crack with sandpaper or a file. Paint the iron with the copper sulphate solutions until a thin layer of copper has been deposited on it. This surface will then take soft solder very nicely.—N. T., N. Y.

* * *

Lead Washers.

Do not forget that fiber washers should never be used in the fuel line or in any part of the engine where the gasoline can get at them.

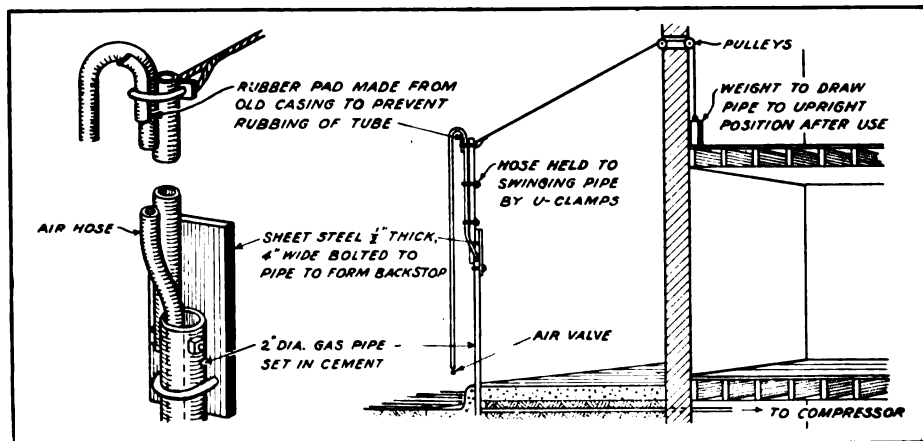
The action of gasoline upon the fiber washer has a tendency to make the motor run sluggishly by forming a deposit of minute particles from the fiber. For this reason, lead washers should always be used in the fuel line and similar locations.

* * *

Practical Home-made Air Stand.

The accompanying sketch shows how we made an air stand at our garage that served the purpose quite satisfactorily. The air hose comes up through the pipe and is held to the swinging pipe by "U" clamps. The weight to draw the pipe to the upright position is adjusted to rest on the floor just before the pipe reaches the back stop.

The sketch is self-explanatory, I think. It works. Perhaps it will help others.—V. S. L., Wyo.



Details of Construction and Arrangement of a Practical Home-made Air Stand.



GTD Reamer
for Ford
Spindle Arm
and Ford
Spindle Body
Bushings
No. 2713-14
Lists at \$2.50



GTD Reamer
for Ford Piston
Pin Bushing
No. 3022½
Lists at
\$1.75

How many Ford Bushing jobs make a barrel of money? Ever try to find out?

*Would you if it cost
less than \$4.25 to learn?*

Here's how to get a barrel of money out of Ford Bushing jobs.

First get these two GTD non-chattering Spiral-Fluted Reamers specially made for Ford Bushings numbered 2713, 2714 and 3022½. Be sure and ask for GTD. List price for the two \$4.25.

Then don't wait for the Ford car owner to ask about having his bushings fixed.

Sell him the job when he comes in to have other work done. If you have the motor down, explain to him that as long as it is down it won't cost much to replace his worn piston pin bushings (No. 3022½).

Shake his steering wheel. Call his attention to the play in the spindle arm and spindle body. Tell him how much easier his car will steer if he'll let you renew the bushings (parts Nos. 2713 and 2714). Then get out your GTD 1424 or 1425 Ford reamers and go to it. Do these short jobs at a good profit.

These GTD reamers will pay for themselves on the first few jobs you do. If you haven't got them—order from your supply dealer today.



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AG 504

Readers' Questions and Answers

Treatment for a Sulphated Plate.

Would appreciate your answering in readers' questions the following: What can be done with a plate, positive or negative, which has become sulphated due to lack of filling cell with water and shows a black streak across the water level which cannot be driven off through charging?

Also, please explain briefly how the ampere-hour rating is determined; whether the battery is discharged continuously for a given time or spasmodically.

Thank you in advance for your kind and prompt attention.—J. F., Pa.

We recommend that the electrolyte be poured out of the cell and that it be filled with water (preferably distilled water) and charged at one-half the normal rate until there has been no change in the gravity reading for at least 12 hours.

If the gravity readings during this charge increase beyond 1.150, some of the electrolyte should be poured out and be replaced with water to bring the reading down below 1.150. Several readjustments may be needed during the charge to keep the gravity down to within this limit.

It has been found that by keeping the gravity below 1.150 the plates can be restored to a healthier condition and in a much shorter time than when the attempt is made to give the charge in high gravity electrolyte.

It is very important that the charge be continued until the gravity has stopped rising for at least 12 hours. If there is any doubt, the charge should be continued further. If the charge is not given properly, the cell is likely to be inefficient and to lose capacity when standing on an open circuit, or while on a car and not in use.

The ampere-hour capacity is determined by discharging the battery at a fixed rate until the potential difference at the terminals falls to a certain point called the final or "end" voltage. The ampere-hour capacity is then the number of amperes multiplied by the number of hours of the discharge.

In making such a test, the rate of discharge is important. Generally some particular rate is spoken of as the normal rate and the capacity is usually expressed as the ampere hours which the battery can deliver at this rate. In making a capacity test of any battery, it is important that the end voltage be correctly chosen. In general, the appropriate final voltage is lower as the rate of discharge is higher.

The ampere-hour rating for an automobile type battery is given usually on the intermittent basis. As an illustration, a 15-plate "XC" Exide cell, which is the size used rather generally, has a capacity of 105 ampere hours on the intermittent basis. This covers the amount of discharge in ampere hours which can be taken out in

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

72 hours or more at varying rates, both high and low. It is also termed a "service rating."

The same capacity for the 3-ampere rate may be had for certain types, while certain types of cells have a different capacity at the 3-ampere rate. The difference is due to the difference in plate thickness—the thinner plates showing less capacity excess over the continuous discharge rating, as all of the material in the plate is used to a greater proportionate extent.

In general, a larger ampere-hour capacity will be observed in cases of the intermittent discharges than for continuous discharges at the same rate. Intermittent tests are usually designed to imitate the services to which the battery will be subjected.

* * *

Hardening of Copper.

I would appreciate it very much if you will give me some information regarding the hardening and tempering of copper.—L. M. T., Minn.

There is nothing new or mysterious about hardened copper. It is not one of the lost arts; immense quantities are in commercial use and added uses for it are being found every day.

There are two well-known methods of hardening copper, the first being by means of mechanical working, while the second is to alloy it with a certain amount of another metal and in some cases with more than one metal.

As examples of the first kind of hardened copper, we may consider hard-drawn copper wire and cold-drawn tubing. The

wire used for everyday trolley systems is a good example of one of these classes.

Copper hardened by the second method is not usually referred to as copper but as brass and bronze. Many persons, apparently ignorant of the fact that hardened copper is in use every day, have so manipulated the melting of copper in their experiments that the resulting melt is impregnated with oxide.

Cuprous oxide is soluble in molten copper and alloys with it in exactly the same sense as the metals mentioned. Copper treated in this way is considerably harder than the pure metal but is unsuited for most commercial purposes.

A mimeographed circular on this subject may be obtained from the Metallurgical Division, Bureau of Standards, Washington, D. C.

* * *

Timing a Waukesha Motor.

I want to ask you a question to which I shall appreciate an answer by return mail.

I have a Waukesha motor, 30 h. p. type E. Y. E., and have some new timing gears to put in, and I wish you would tell me how to time this motor.

The pinion on the main shaft, or what you call the crankshaft, has 28 cogs, the pinion on the camshaft has 56, the idler has 62, and the pinion that drives the magneto has 28 cogs. The idler runs into the mainshaft gear and the other two gears—that you call the camshaft—on the right upper corner, and the magneto shaft gear on the left hand upper corner; that is, when you face the motor from the front.

Now, I wish you would inform me as soon as possible how to time this motor, for I have tried and I can't tell how it is timed. When it comes to number four, the valves do not open to the right position.—H. J. S., Wis.

On timing valves, the first thing to determine is the top dead center (in this case) of pistons Nos. 1 and 4.

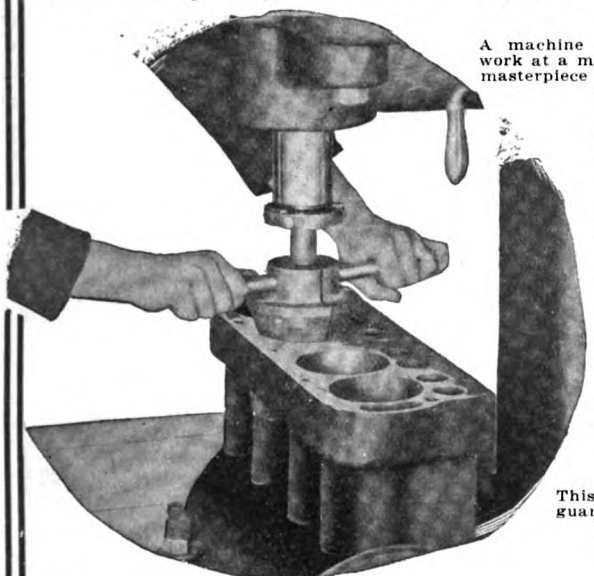
The valve tappets of No. 1 cylinder should be so adjusted that a piece of thin paper will just pass between the valve tappet and the valve stem when the valve is closed or the cam on the camshaft is at its lowest point.

The flywheel of the motor should be turned around until the mark IN. O. 1 + 4 (meaning inlet opens one and four), or perhaps IN. O. 1 (meaning inlet opens cylinder No. 1), appears directly on top (usually about 15 degrees past upper dead center of pistons Nos. 1 and 4).

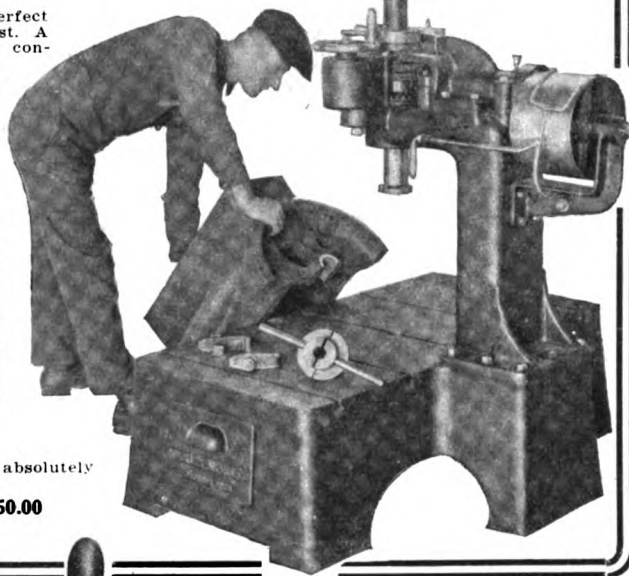
Remove the idler gear from the train of timing gears, rotate the camshaft clockwise until the instant the paper cannot be removed from between the valve tappet and valve stem of No. 1 inlet valve. The crankshaft should not be moved during the setting of the idler gear, which should

DEARBORN EQUIPMENT ALWAYS PAYS DIVIDENDS

Hinckley-Myers Power Cylinder Reboring Mill No. H M-7

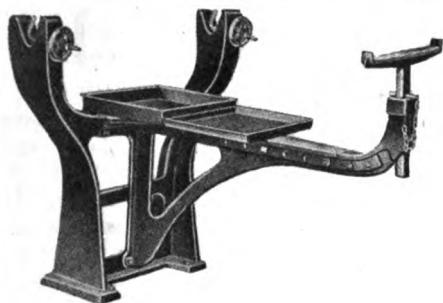


A machine that assures perfect work at a minimum labor cost. A masterpiece of mechanical construction. Features include pilot bar through cylinder, micrometer adjustment of each cutter blade and automatic stop. Positively free from chatter. Cylinders are automatically set at a perfect center by means of a hardened tapering centering fixture. The Hinckley-Myers cutters are adjustable to within .00025 of an inch.



This machine is absolutely guaranteed.

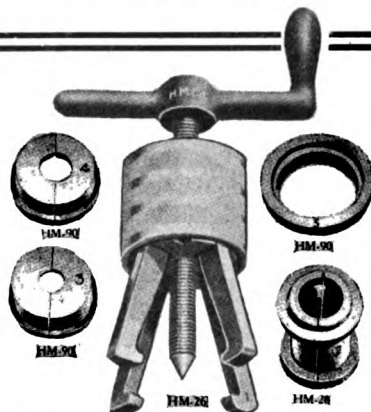
List Price \$750.00



Dearborn Rear Axle Stand No. A B-2

For axles with housing up to 4 1/2" diameter. This stand may be used when overhauling rear axles of worm drive type as well as the bevel gear type. Housing can be secured in any position desired.

Price \$47.50



Ford Generator and Starter Ball Bearing Gear Sets

Adapters for No. H M-26 Gear Pullers. Assure the quickest and most effective method of removing the Ford Generator and Starter Ball Bearing, Steering Wheels, Cam Gear, etc. Complete with all the Adapters.

Price \$17.00



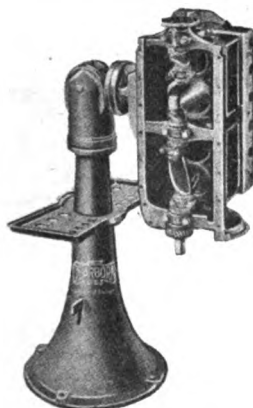
Wheel Pullers

Great savers of labor and time. No. B-1 (shown above) is for rear wheels of Ford car. Very strong and durable. Made of cast steel with hardened screw and strong lever. Weight 4 pounds.

Price \$5.00

No. B-2 is for rear wheels of Ford 1-ton truck. Weight 5 pounds.

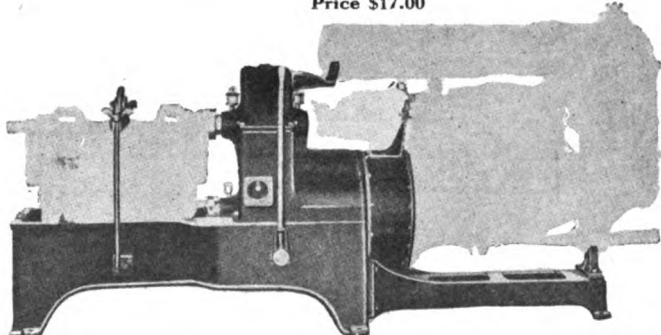
Price \$6.00



Dearborn All-Position Ford Motor Stand No. A C-3

Gives the user really adequate facilities for the overhauling of Model T Ford Motors. The entire motor and crank case can be assembled and placed in any desired position.

Price \$50.00



Dearborn Bearing Burning-In and Running-In Machines

Direct Connected—Pulley Drive and Fordson Motor Drive. Type A-1 for Ford and Fordson Motors.

Price for Pulley Drive \$475.00

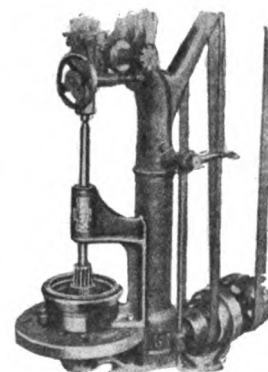
Dearborn Equipment and Hinckley-Myers Company



1503 Tower Building

Chicago, Ill.

Write for literature on our entire line



Dearborn Transmission Bushing Reaming Machine No. L-1

Is so constructed that nothing but perfect alignment can be obtained. Can be bolted to a work bench in horizontal or vertical position. Complete set of reamers with each machine.

Price \$75.00 Complete

be replaced at this position of the camshaft.

This should give you the proper setting. We assume that the camshaft is in good condition. Alignment of the marks on the timing-gear teeth should time the valves as above directed. Your gears are the correct size.

* * *

Internal Action in Battery.

Being employed by one of the leading battery service stations in Philadelphia, and being brought in direct contact with the consumer, there are many questions which are asked that at times are quite difficult to answer.

We subscribe for all the leading journals, and noticing in recent issues of the AMERICAN GARAGE & AUTO DEALER that you have covered so many good points, we thought we would write you on the following:

What internal action will take place if one negative is missing in each element?

What internal action will take place if one positive is missing in each element?

Why, in each element, must there be one more negative than positive?

We have been confronted with these questions so many times that it would certainly be gratifying to be able to answer intelligently.

Thanking you in advance, and trusting we are not imposing on good nature.—E. A. L., Pa.

If one negative were missing in each element, one of the positive plates would not be worked uniformly on both sides and there would be a greater tendency for it to buckle.

In some types of cells using heavier plates than normally used in automobile work, the outside negatives are thinner, even down to one-half the thickness of the inside negatives, so that there is the same material in the cell as there would be with the same number of negatives as positives, and the negatives all of one thickness. You might say offhand that this would give the same negative capacity while, as a matter of fact, it

would not as the outside face of the negative is practically inactive.

In this it is assumed that you are figuring on the basis of using an equal number of positives and negatives—in other words, omitting one end negative.

The breaking off of an inside negative from the strap, so that it is inactive, results approximately in making two half-positives or one whole positive inactive, so that if there are five positives in the cell, the capacity would be reduced 20 per cent.

With one negative plate missing, the chemical action on the surface of the positive plates to which the surface of the negative plate would be presented if it were present, is reduced. This will result in inaction of the corresponding positive active material and probably its ultimate loss by shedding and dropping to the bottom of the jar.

When one of the positive plates is missing, the condition is more serious, due to the fact that the capacity of the negative plates in a normal cell is always in excess of the capacity of the positive plates in the same cell.

It is true, therefore, that when one positive plate is eliminated from the positive element, the active material on the surface of the negative plates to which the surface of the missing plate would be presented becomes inactive, with the probable result of its early loss by shedding and dropping to the bottom of the cell, and in addition, owing to the sharp reduction in positive capacity, a more rapid working of the active material on the remaining positive plates, resulting in the probable early destruction on account of being overcharged and overdischarged by conditions which are normal for the remaining cells of the same battery in which all the plates are present.

No internal action will result other than that outlined, unless the missing plate is

allowed to remain in the cell and assumes a position which will short-circuit the battery by establishing a more or less intimate contact between the positive and negative elements.

Elements generally have one extra negative plate, thus bringing negative plates on both outsides. As negative plates grow old, they usually lose capacity on account of the shrinkage of the active material, closing up the pores. To allow for the falling off in capacity the negative plates are usually manufactured with an initial capacity in excess of that actually required.

Extra positives are often used to give extra capacity but the life of this combination is less on account of the distortion produced in positives worked on one side only.

* * *

Wiring Diagram for Elcar.

Would it be possible for you to publish soon the wiring diagram for the Elcar D-4, 1919 model?—I. R., Iowa.

The wiring diagram which you request appears on this page.

* * *

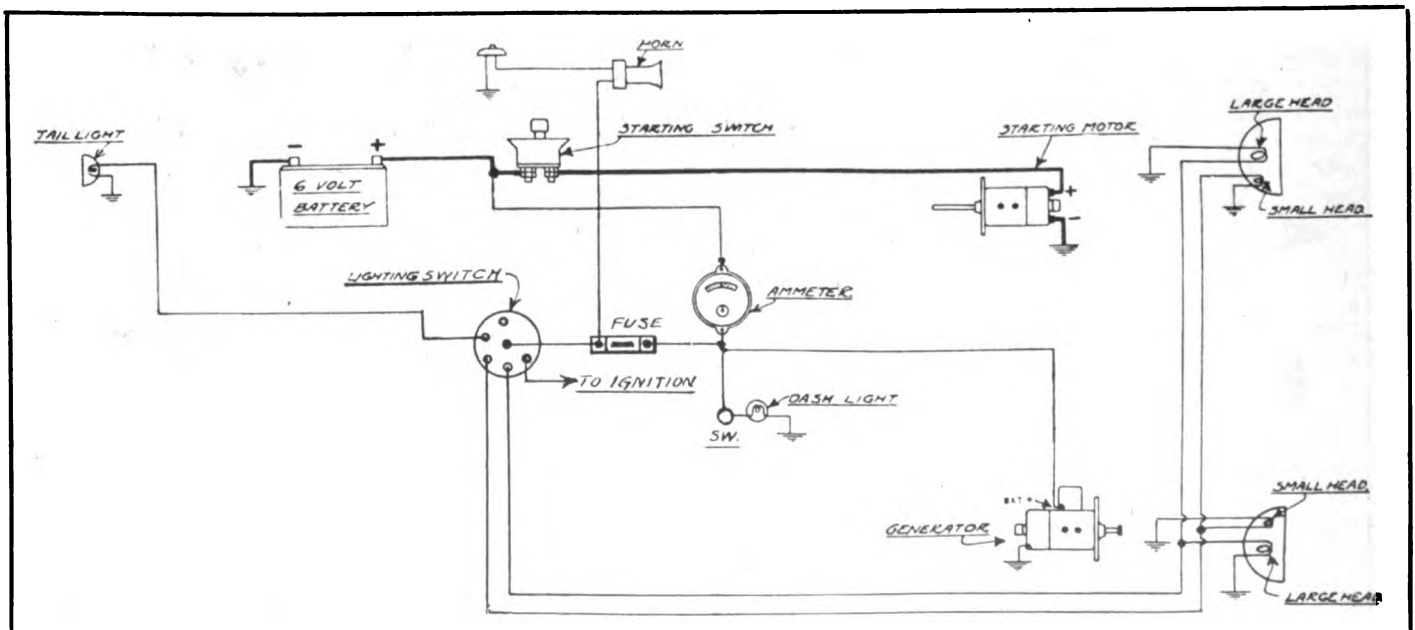
Battery Won't Take Full Charge.

I want to ask a question about the Willard thread rubber storage battery. I have one which will not take a full charge and far from it and does not hold it, a new battery.—E. E. K., Iowa.

Judging from your description of the trouble with the battery mentioned, we would say that the plates are badly sulphated, or your trouble may be due to an accumulation of foreign matter on top the battery jars causing a short circuit.

A weak electrolyte would prevent the battery taking a full charge but this is unusual in a new battery, unless some of the liquid has been spilled and replaced with water.

We assume that the wiring and generator are in good condition.



Wiring Diagram for Elcar Models D, E, F and G, 1917-18-19.



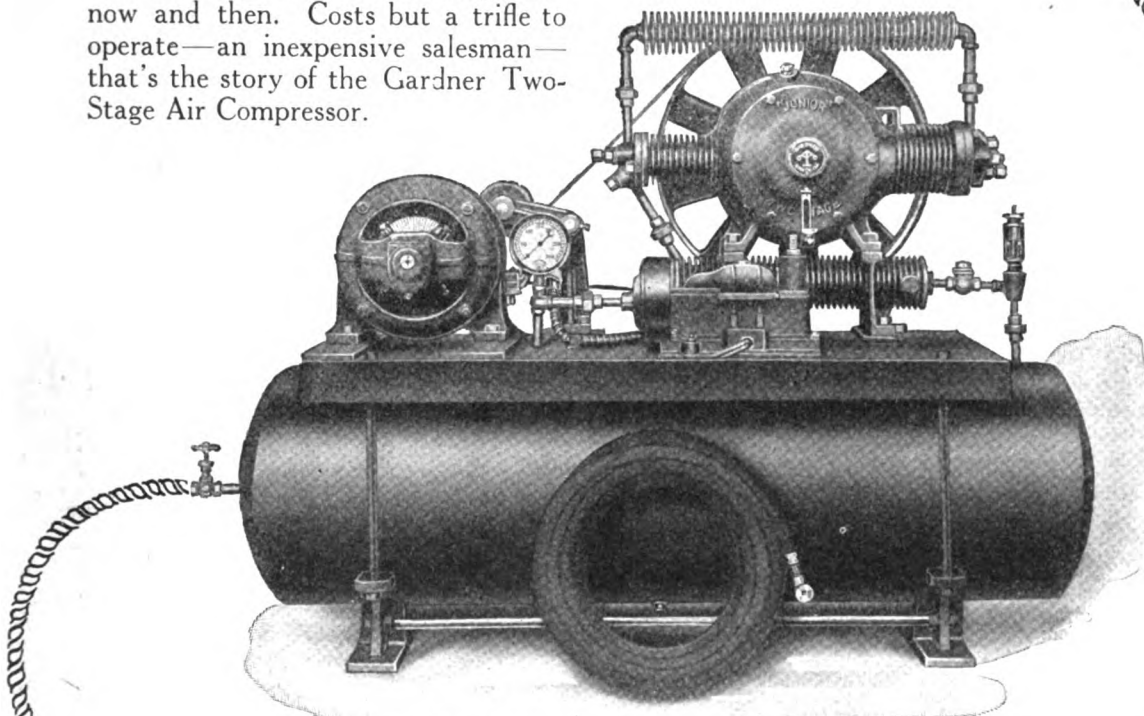
Write for attractive circular "Three Reasons Why," which gives an interesting account of the GARDNER.

The Gardner ^{Two}Stage Air Compressor

An Inexpensive Salesman

Did you ever sell a tire to the motorist who drives **past** your door? Attract him with courteous, efficient service. Stop him with 200 pounds air pressure ready at an instant's notice.

The Gardner requires none of your attention except to oil the moving parts now and then. Costs but a trifle to operate—an inexpensive salesman—that's the story of the Gardner Two-Stage Air Compressor.



C. A. DICKERSON

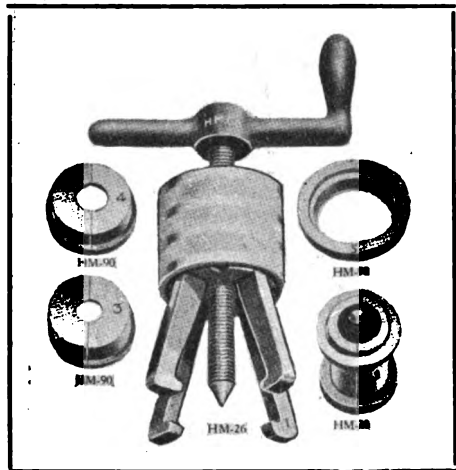
DISTRIBUTOR

614 Fisher Bldg., Chicago

Up-to-the-Minute Garage Equipment

Generator Shaft Will Not Be Damaged if These Adapters Are Used.

The Dearborn Equipment & Hinckley-Myers Co., 1503 Tower Bldg., Chicago, is marketing adapters for the No. HM-26



Prevent Damage to Generator Shaft.

gear pullers, which when used in conjunction with the HM-26 gear puller, they claim offer the quickest and most effective method of removing the Ford generator and starter ball bearing, steering wheels, camgears, etc.

They are constructed with divided collars which are easily removed from the puller upon the release of the bearing from the shaft.

These adapters, it is said, are especially useful as they eliminate the danger of bending or otherwise damaging the generator shaft, which often occurs when makeshift methods are employed.

When you write the Dearborn Equipment & Hinckley-Myers Co. regarding the adapters, please mention the American Garage & Auto Dealer.

Mr. Garageman! Be on the Lookout for the Eclipse Folder.

Every garageman will get a folder one of these days from the Eclipse Valve Grinder Co., for it is sending them out to all of the garages in the United States.

"Time saved is money saved in this rush and speed-up day," the booklet states. Then it tells you all about the way you can do a better job in one-tenth of the time with the Eclipse electric valve grinder—the valve grinder with the ballistic movement.

"Just a little grinding compound spread on the valve, a minute or so with the grinder, and both valve face and seat are smoothed to a clean, hard finish—absolutely gas tight. There is no grooving and scoring—the rapid oscillation prevents all that and the slow rotation insures an equal amount of treatment to every part."

So when the folder comes along, Mr.

Garageman, tear off the postcard that is attached and mail it to the Eclipse Valve Grinder Co., at Kansas City, Mo. It will send interesting information free of charge.

Novel Window Display Features Nokorode Products.

A real "silent salesman" is the display window of the Belcher & Loomis Hardware Co., Providence, R. I., and undoubtedly a most effective one also.

As will be seen in the illustration, the display features the Nokorode products—Nokorode soldering salts, Nokorode solderkit, Nokorode soldering flux, etc. And the varied uses of these excellent products are well brought out by the articles used in the arrangement of this display.

The motorist, of course, in this economical day, is attracted instantly by the large placard announcing how "A Repair Bill May Be Saved." The mechanical man is interested in the tools and parts, and the practical illustrations of the uses for Nokorode in connection with the operation of these tools. The tank and submarine naturally attract the interest of many who might otherwise not notice the window.

Then there's the appeal to the money-earning instincts of the boys by the offer to tell them how they may win a prize. Maybe others who are no longer boys will be interested in this prize feature also. Of course, this helps in informing the general public regarding the efficiency and general desirability of Nokorode products.

Those who may desire definite infor-

mation concerning Nokorode soldering aids may write the M. W. Dunton Co., 150-152 Niagara St., Providence, R. L., for it. Please mention the American Garage & Auto Dealer when you write.

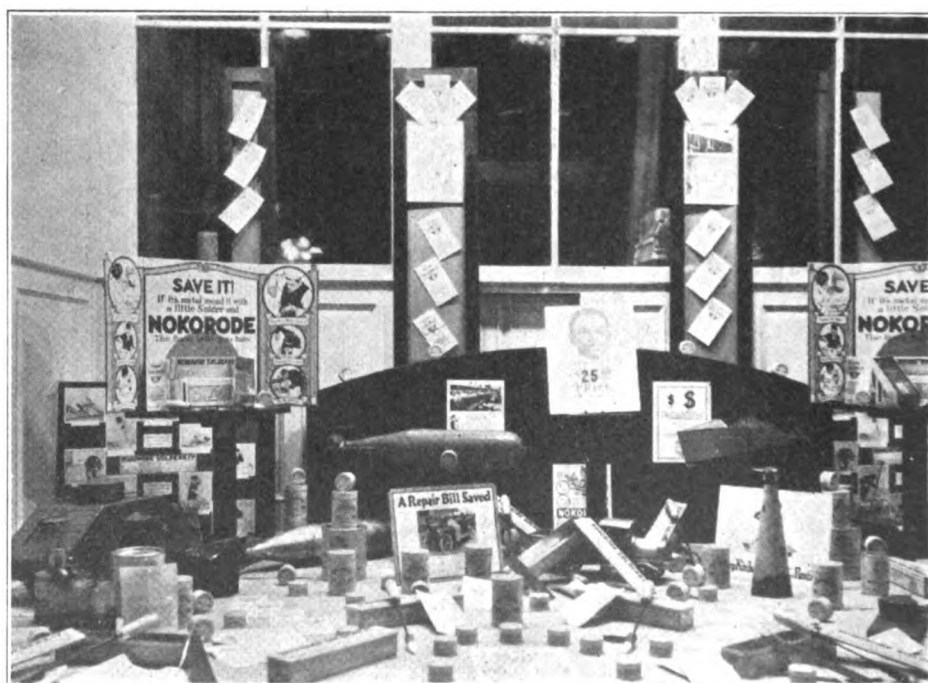
The Newly Patented "Western" Super-Vulcanizing Outfit.

The Western Rubber Mold Co., 243 North Crawford Ave., Chicago, has just received its patents on an adjustable, sectional mold outfit which it claims is the most versatile ever offered to the trade.

With this new mold, its manufacturer claims to be able to accurately fit any size, type, or brand of cord or fabric tire made, from 3 inches to 5½ inches, inclusive. The company had previously placed a truck mold on the market which was adjustable in the same manner, and the same principle—with many improvements—is applied to passenger tires. This adjustment is accomplished in the following way:

The molds are split into halves—one side stationary, the other side adjustable—and are held together by large bolts. By loosening these bolts, spacers of different widths may be inserted between the halves along the bottom of the mold to make any necessary adjustment in cross-sectional width.

These spacers, it is said, have been proven to give an absolutely even cure. Since the points of contact are perfectly machined, the heat travels through from one half to the other and, by being tightly clamped between the two halves, the



Nokorode Products Used to Make Up This Attractive Show Window.



"The Eyes Have It!"

The Boy and Slate Sign Gets the Eye—Makes Sales

ALL eyes are on this immense Boy and Slate sign from the moment the dealer sets it up. It is the greatest attention-compelling novelty—the most unusual and attractive advertising device ever put out.

The size of it (over six feet high) won't permit of a passer-by, on foot or otherwise, getting by without seeing it. It is made so that "those who run may read." Every other day you chalk in a new saying on the big slate. We supply you with enough of these sayings to last a year. These epigrams, or sayings, are snappy, clever and funny. This keeps people looking for them; it keeps the sign new, it gives you and your business a progressive, up-to-the-minute character.

This kind of advertising attracts people to you and makes sales for you. It's the kind of advertising that stays and pays.

The boy is over six feet high—painted in brilliant colors, cut out all around and mounted on frame work so that you can stand him where he will get the most attention. It's a winner.



How to Get This Sign

Write to us for offer and full particulars about the "Boy and Slate" service, and for prices and other selling helps on En-ar-co Motor Oil, En-ar-co Gear Compound and other En-ar-co brands. Remember we furnish the signs and enough slogans for the entire year. Get this offer—use the coupon.

The National Refining Co.

NATIONAL HEADQUARTERS

B-731 National Building, Cleveland, O.

5 Modern Refineries 95 Branch Offices

THE NATIONAL REFINING COMPANY

B-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name

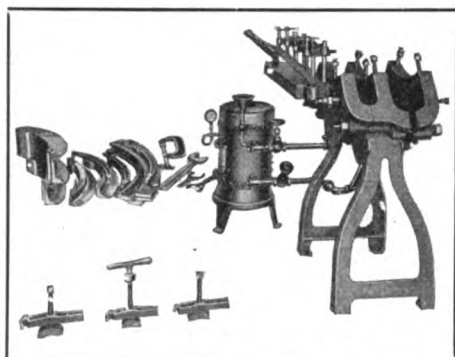
Address

City State

I now sell oil

spacers are really the same as if an actual part of the steam-jacketed mold, so that, states the manufacturer, there is not even a fraction of a degree's difference in the heat in the spacers and that in the side wall.

The molds are designed both as double-



Adjustable Molds Are the Features.

cavity and single-cavity molds, one cavity being for all the larger passenger tires and the other for all the smaller ones.

The double cavity has a central steam chamber, the two outside walls being adjustable to the central ones. The single molds are made up of a pair of these outside halves. Each part is interchangeable and, if a part is broken or cracked from misuse or defect, a duplicate part can be shipped which will fit accurately the remaining parts.

Steam is transmitted from one chamber to the other by means of a packed sliding gland, which is always active, allowing the mold to be adjusted from one size to another without requiring the shutting off of the steam from the mold. This feature, it is claimed, does away with the need for having the adjustable side connected with the steam hose; also, since the sliding gland works in exactly the same manner as a piston—regardless of what width the mold is adjusted to—the gland is always open for the passage of steam.

Extra long, steel clamp screws are provided, so that a sand bag may be used in repairing tread cuts or spot patches. Ordinary sections, of course, must be cured with the air bag pressure.

The bead molds are adjustable in the same manner as the mold itself and, since the clamps are also adjustable, only one set for each mold is necessary.

These molds, it is said, not only prevent unsightly sections, but will also eliminate the possibility of a "buckled" fabric. Since they may be easily adjusted to any size necessary in less than 30 seconds, it is claimed that they will naturally have a greater capacity in the amount of work that can be produced.

Tires coming in for repairs do not usually run equally to the different sizes of molds in the shop. With these molds, the two different sized cavities which are furnished are adjustable to within an eighth of an inch, so that they can handle intermediate sizes of tires without difficulty.

Another feature which the manufacturer considers to be in favor of his product is the fact that, owing to the adjustable features of the molds, it is very easy to insert or remove a tire. With one-half of the mold adjustable, the vulcanizer need only loosen the side and the steam pressure, passing through the sliding gland which works as a piston, will almost loosen the tire without extra labor, making it a very simple matter to remove the casing.

This same feature also makes it easy to insert the tire, for it may be left open to any width desired until the tire is between the halves with the bead-plate in place, after which the halves may be drawn together to the proper size.

The vulcanizer who has an outfit of these molds, asserts the manufacturer, is not affected by any changes in the percentage of over-sizes by tire manufacturers. If necessary, additional spacers can be furnished to take care of any possible size which may be put upon the market.

To give every established vulcanizer an opportunity to install one of these excellent machines, the Western Rubber Mold Co. has adopted the plan of making a generous offer for his old equipment in trade on a new outfit of "Western" expansive molds.

When you write this company for further information please mention the American Garage & Auto Dealer.

If You Want Perfect Accuracy Try This Cylinder Reboring Machine.

One of the many interesting features to be noted in the new Hinckley-Myers power cylinder reboring mill, No. HM-7, is the method of centering.

The cylinders are automatically set to a perfect center by means of a hardened tapered centering fixture, as shown in the illustration. This fixture is split and fits around the pilot bar which is located at the bottom in a hardened steel bushing. After the cylinder is centered, it can be quickly and securely clamped to the base.

Further, it is claimed that the adjustable cutters with which this machine is fitted, being simple in design, are easily set for reboring cylinders of any de-

sired size even to the finest point of adjustment. Each cutter blade is set to gage, separately. There is a positive locking device which, it is said, makes it impossible for the cutter blades to slip or change position while in operation.

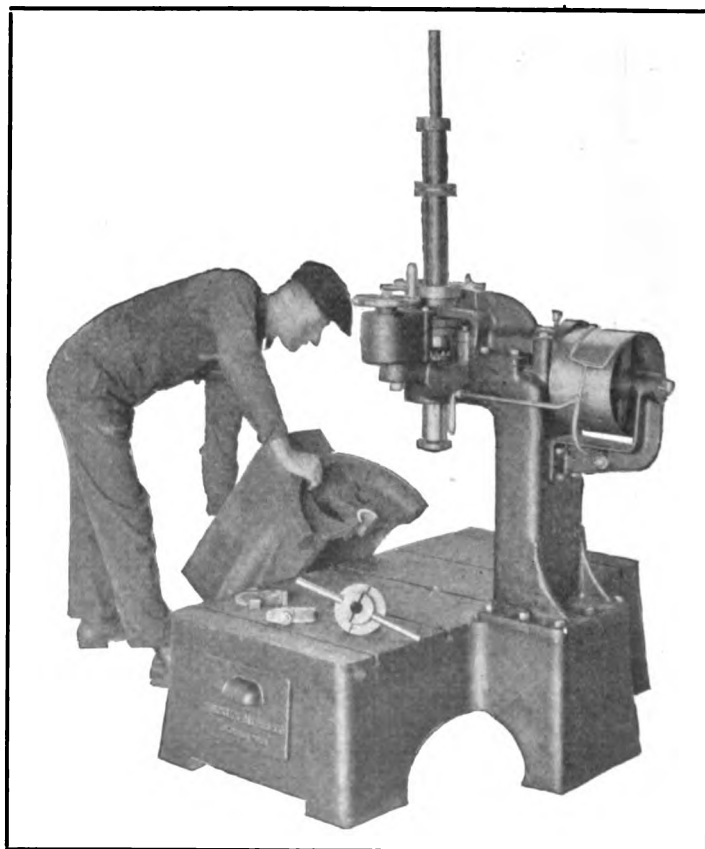
All cutter blades are ground and honed to a perfect finish. This, the manufacturer states, insures a clean and smooth cylinder wall.

It is said that the specially-designed micrometer on this reboring mill makes it possible to set the Hinckley-Myers cutters to within 0.00025 of an inch.

The setting of the cutter blades is quickly accomplished. The cutter head is screwed into position on the cutter tube and the sizeometer, set to the desired size, is inserted into it. A screwdriver is then used to turn the cutter-blade screw, which brings the cutter blade into perfect contact with the sizeometer. The locking device is then tightened by means of a small wrench. The adjustable stop collars, which can be set at any desired depth, and adjustable bronze bushings to take up wear, are also to be noted as adding to the reliability of this machine.

Since the bed plate of the Hinckley-Myers power cylinder reboring mill is only a few inches above the floor, it is said that one man can readily place any ordinary cylinder block in position for reboring without the use of a chain hoist or crane. Parallel grooves provide adequate locking supports for holding the cylinder securely in the desired position.

The surface of the bed plate is, of course,



Surface of Bed-Plate at Perfect Right Angles to Pilot Shaft.



What is an Oil Groove?

What is it intended to accomplish? How does it function? How and where is it cut into the ring?

If cut **up, around and down** to the joint, rather than **straight around** the ring, it's the wandering oil groove of the General Lightning Cut Piston Ring.

On the upstroke of the piston this groove carries just enough oil to lubricate both ring and cylinder walls and to minimize friction and wear.

On the down stroke, the scraping edge of this oil groove, cut at an angle of 45°, returns all excess oil to the crankcase, prevents the use of too much oil and an excess of carbon.



This Book is Yours Free

Distribution or circulation of the oil is due to the groove being cut **downward**. The tiny particles of carbon that clog and defeat the purpose of other oil grooves must "move along" as a rolling stone on a hillside.

This, in short, is why General Lightning Cut Piston Rings are not only long lived but secure more power on less gas, less wear on less oil and function more efficiently than other rings. More information gladly given. Correspondence is invited from garages, repair shops and dealers.

GENERAL UTILITY COMPANY

1326-28-30 Ogden Street, Philadelphia, Pa.

Export Department: 17 Battery Place, New York City

General LIGHTNINGCUT PISTON RINGS

Now 50c
and up

Now 50c
and up

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

at perfect right angles to the pilot shaft thus, it is claimed, assuring that the re-bored cylinder walls will be at perfect right angles to the top and base of the cylinder block and all of the cylinders parallel to

investigations to collect and compile the data it contains. It is a 192-page book, measuring approximately 4 ins. by 7 ins., with a cover printed in three colors, giving an "olive-drab" effect that will not soil readily.

A copy of this helpful book will be mailed on request by the Burd High Compression Ring Co., Rockford, Ill. When writing for copies mention the American Garage & Auto Dealer.

Greb Rear Axle Press Has Enthusiastic Booster.

"Can I fix that axle for you? You bet I can," answered our town's most enterprising garageman.

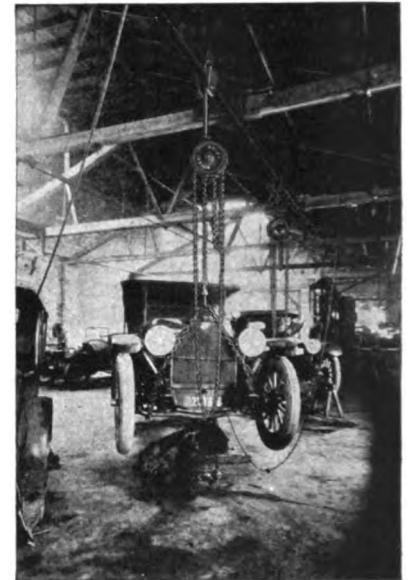
"I've just got a new piece of equipment here that is a wonder. This Greb rear axle press is a real helper, I want to tell you. With it I can remove axle and drive-

throughout, so you see it will last indefinitely. I'm certainly strong for my Greb rear axle press. I'll say I am!"

The Greb rear axle press is marketed by The Greb Co., 172-173 State St., Boston, Mass. Write to the Greb company for details, and mention the American Garage Auto Dealer when writing.

High-Speed Chain Hoists Prove Value in Garages.

The use of chain hoists in automobile repair shops or garages is, of course, a necessity, but the proper selection of a hoist as to type involves an understanding



Chain Hoists Save Man-Power.

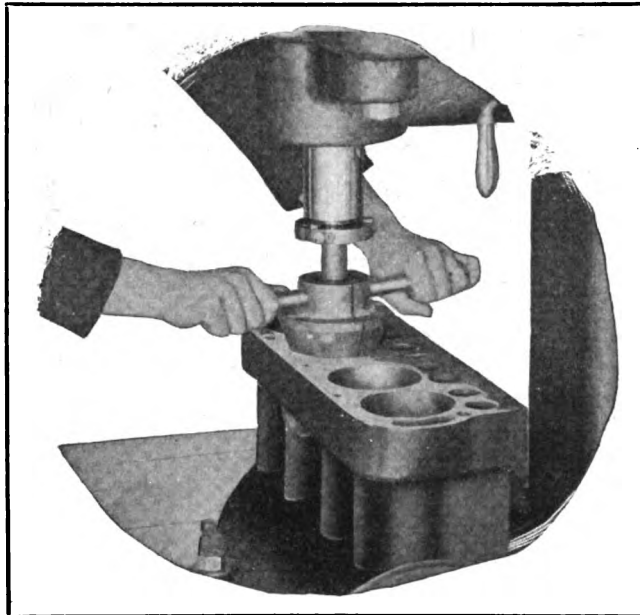
of principles that are frequently overlooked.

In addition to price, two other factors must be duly considered when a new hoist is to be installed. These are speed, or the number of feet of hand chain that must be overhauled to raise the load a given distance, and force, or the pull in pounds required on the hand chain to raise the weight.

As ordinarily made, the number of feet of hand chain that must be overhauled to lift a given load is about the same as with other types of hoists. Evidently, then, it is the question of force, or the effort exerted on the hand chain, which establishes the superiority of high-speed hoists, says the manufacturer.

In practically all cases, and especially in automobile repair shops, it is claimed, the high-speed hoist is by far the cheapest to use on account of the fact that it prevents the unnecessary waste of human effort—the most expensive of any kind of power that it is possible to buy.

These high-speed hoists are being marketed by the Wright Mfg. Co., Lisbon, Ohio, which will gladly supply detailed information concerning them upon request. Please mention the American Garage & Auto Dealer when writing to this company.



Tapered Centering Fixture Sets Cylinders Automatically.

each other. In short, says the manufacturer, if you are looking for speed, simplicity, accuracy, reliability and power, backed up by an absolute guarantee, you may have it in the Hinckley-Myers power cylinder reboring mill No. HM-7.

In order to place this very useful piece of equipment within the reach of all, this company is offering to sell it on a two-payment basis to garages, repairshops and service stations.

Write to the Dearborn Equipment & Hinckley-Myers Co., 1503 Tower Bldg., Chicago, for full particulars concerning the cylinder reboring mill HM-7 and their special offer. In writing please mention the American Garage & Auto Dealer.

A Piston Ring Directory Worth Adding to the Bookshelf.

The new 1920-1921 edition of the Burd piston ring directory is just off the press, and the Burd High Compression Ring Co., the publisher, claims that it is one of the most complete books in existence devoted to piston rings.

It gives the piston ring dimensions, year, model and number of cylinders, for practically all makes and models of automobiles, trucks, tractors, motorcycles, gasoline engines, marine engines and airplanes. In addition to the tabulations of sizes, it contains much helpful information for ordering, handling and installing piston rings. Valuable tables of standards that every repairman should have are also published in it.

More than a million "ems" of type and a carload of paper were consumed in the printing of this directory, not to mention the many months of careful research and

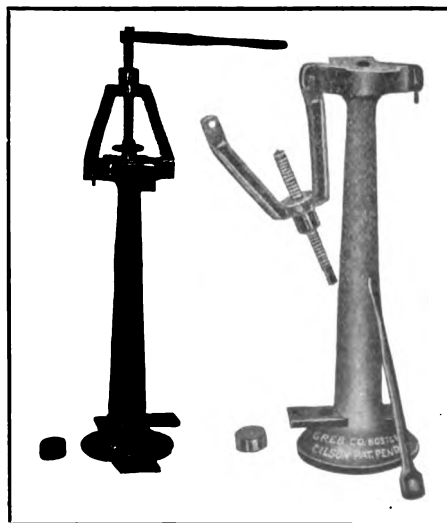
shaft gears and press on axle gears.

"It will take shafts up to 1¼ inches and gears to 6½ inches. It will also remove connecting-rod, wrist-pins, timing gears, and spindle body bushings. It can be used for straightening connecting-rods or other small work.

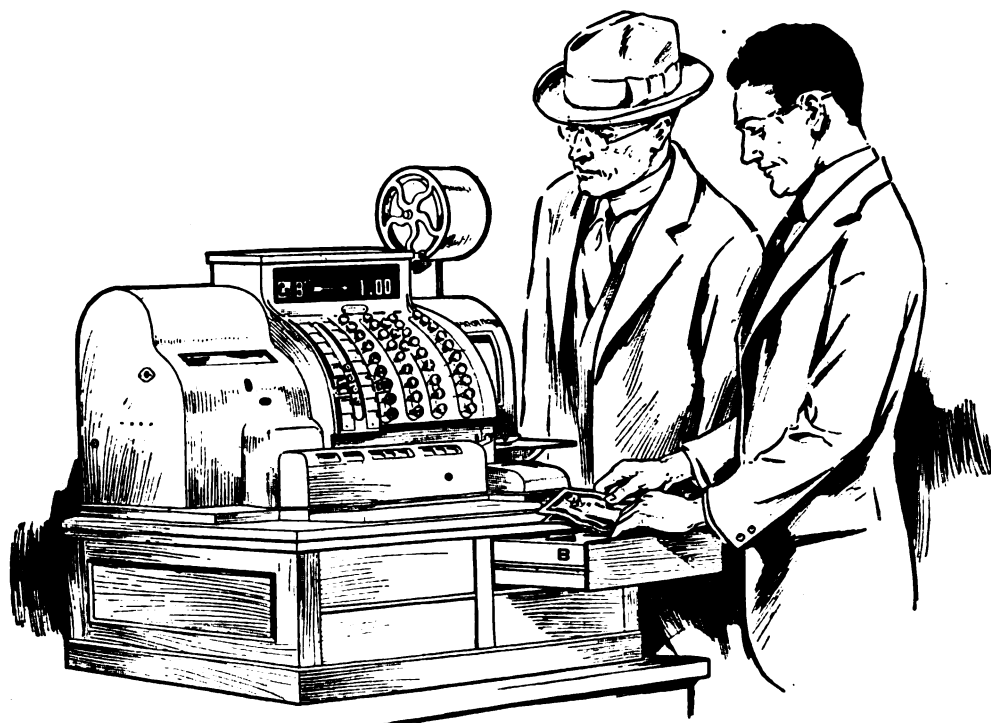
"By pushing the base plate to one side. I have a solid base for the axle to rest upon, and by pushing the plate in the opposite direction, the hole centers with the hollow shaft allowing the axle to pass through the base.

"The press may be secured in an upright position or can be used horizontally by means of a hinge. When in a horizontal position, it can be used on work of unlimited length.

"It is of malleable iron construction



Removes Axles Quickly and Easily.



Clerk B has made a cash sale for \$1.00

The indication at the top of an up-to-date National Cash Register gives publicity to every transaction. The merchant, the clerk, and the customer see this record.

This prevents mistakes in price and in making change. It removes temptation.

The record shown in the indication is printed on a strip of paper which is locked up inside the register. This record also is printed on a receipt for the customer.

The amounts indicated and printed are added into totals which show, at a glance, (1) the total business handled by each clerk, and (2) the total of each kind of transaction.

This assures the merchant that every sale is handled accurately. It also assures him of accurate records which give him control of his business.



This is the indication. "Ca" shows it was a cash sale. "B" is the clerk's initial. "1.00" is the price.

Charge sales are indicated by "Ch," received on account by "Rc," and paid out transactions by "Pd."

The same indication shows on both front and back of the register.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL

CASH REGISTER CO.

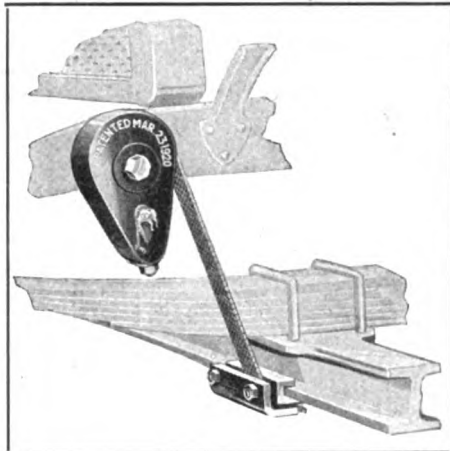
DAYTON, OHIO.

Accessories—Dealers' Key to Profits

"Bull Dog" Bounce Absorbers May Be Adjusted to Weight of Car.

The illustration shows the "Bull Dog" bounce absorber No. 12, which has been made to fit cars that are drilled for bounce absorbers, or cars on which special drilling will give better installation.

The principle of construction of these "Bull Dog" shock absorbers, as outlined



"Bull Dog" Bounce Absorber No. 12, Front.

by the manufacturer, is that they check the rebound gently by the friction of the brake lining and strap on the brake drum, thus absorbing every road shock.

It is further claimed that they may instantly be adjusted to the weight of the car, rigidity of springs, or preference of the driver.

When you write the manufacturer, Channon-Hughson Co., 229 West Erie St., Chicago, for information concerning the "Bull Dog" shock absorbers, please mention the American Garage & Auto Dealer.

New Kampkar Meets with Enthusiastic Approval of Customers.

Basson was one of the most progressive of the automotive dealers in one of the busiest and most prosperous of our Mid-Western cities.

His display windows were invariably such as to attract the interest and admiration of passersby. But this morning he admitted to himself that he was "stumped," as he stood looking at the display in the window. He wanted something that was really new and different, and he had not the remotest idea where to go for it.

It might be, he thought, a vacation idea of some sort, for though early in the summer it was very warm and the people were already discussing vacation plans. Discouraged, he turned back to his desk to open his morning's mail.

It so happened that the first letter he opened enclosed a circular descriptive of a new camping outfit known as the "Kampkar." Still occupied with the problem of his window display, he was laying the circular aside for a more leisure moment, when suddenly he paused. Then taking up the circular once more, he studied it intently.

"The very thing," he murmured, the perplexed frown he had worn replaced by a satisfied smile.

Two weeks later the busy corner on which his store was located was busier than usual. Somehow people seemed just to reach that corner and stop, unable to go farther. Everyone was trying to look into the Basson windows at the same time, it appeared.

Exclamations typical of the varied types of the gazers were heard on all sides.

"Gee! Ain't that a bird!"

"A peach if I ever saw one."

"Oh, wouldn't it be just perfect to go camping in that?"

"Say, man, if I had one of those I'd be on my way north in short order," and so on.

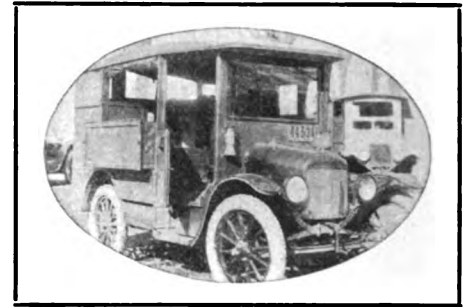
The cause of the excitement? Well, Basson's idea had borne fruit, just as he had confidently expected it would. One of the new Lamsteed Kampkars held the center of the display. It was open so as to show the compact convenience of its arrangement. In this the old adage had been literally applied—"A place for everything and everything in its place."

Ample locker space for clothes, food, water, gasoline, stove and icebox—all were provided for in this wonderful new camping car. It showed two comfortable beds, each 6 ft. 4 ins. by 42 ins. wide.

To the rear of the Kampkar, so placed as to give the impression of distance, ran a

swift little brook, and knee-deep in the brook, in good-looking hunting garb, stood the figure of a man in the act of reeling in a troutline caught on the hook of which was a great speckled trout, apparently fighting furiously.

Effectively grouped on either side and in front was scenery presenting a characteristic woods scene, while reclining comfortably in the Kampkar, pipe in mouth and



All Ready?—Let's Go.

book in hand, was the figure of another man.

All in all, it presented a most alluring suggestion for a camping vacation with "all the comforts of home."

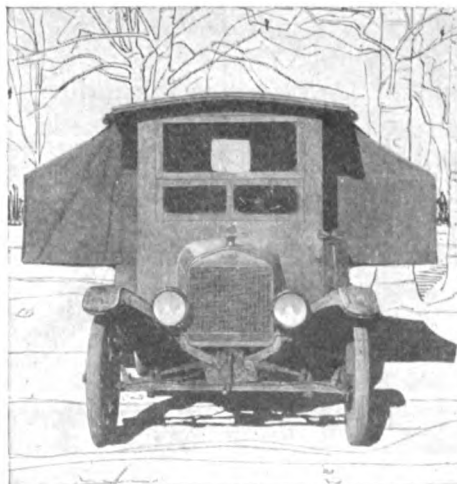
Basson later declared that it was the most profitable display he had ever made. From the crowds who viewed his window each day, many entered the store to question concerning the outfit. When they learned that the Kampkar could easily be mounted by two people on a Model "T" Ford chassis, a section at a time, and also that because of this section feature, it could readily be taken down and stored in a small space, they grew enthusiastic.

Built of the lightest and strongest materials, like an airplane, the body is so designed as not to overload the Ford chassis, and the whole car, when closed, is no wider than the ordinary Ford sedan.

And such a diversity of customers! The hunter, the Ike Walton devotee, the camper, the tourist, the health seeker and the commercial traveler, a surveyor and a mining prospector, were numbered among them—and each and all found in the Kampkar just the outfit he had longed for yet never hoped to find.

A dealer from another city, happening by, was so much impressed that he stopped to inquire of Basson where the car was made, to which query Basson, in view of his own success, was very glad to give the name of the makers—the Camping Car Co., 2100 Locust St., St. Louis, Mo.

Dealers, or others, interested in obtaining further details concerning the Kampkar, are requested to mention the American Garage & Auto Dealer when writing to the Camping Car Co.

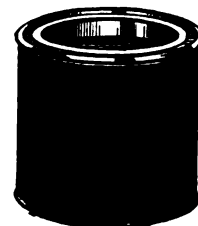


Camp In Comfort With the Kampkar.

Non Freezing



Non Drying

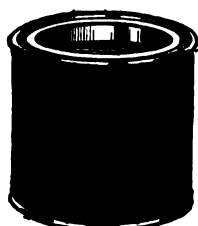


GRINDING COMPOUND

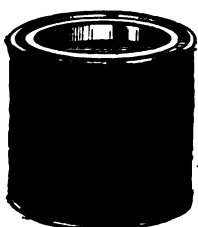
Stops waste—Swells profits



Water-mixed "PEP" brings an end to the waste of time and labor that attend the grinding of valves with oil mixed abrasives. "PEP" combines the cutting and finishing grades of other compounds, thus reducing waste of material and expensive containers. "PEP" seats a valve in one operation, thus cutting the time and labor required in half.



Moreover, the work done with "PEP" greatly excels that turned out with oil mixed abrasives. Where oil is used, the coarser particles of the abrasive, traveling in ruts, leaves rings and grooves on the valve face and seat. These are often visible to the eye even after the finish is applied. When you use "PEP" both valve face and seat are finished perfectly. Water, being thinner than oil, distributes the abrasive freely and evenly.



"PEP" is extremely clean and convenient to use. Only a water-dampened cloth is required to wipe the valves before and after grinding.

Thousands of shops have increased the profits of their valve grinding work by adopting "PEP." It not only cuts the cost in half, but does infinitely better work—the kind that builds business.

WORCESTER ABRASIVE CO.

1662-1664 Broadway, New York City

Refer to list of jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book"

FREE

**WITH YOUR JOBBER'S O. K.
ON THIS COUPON WE WILL
SEND YOU A SAMPLE CAN OF
PEP FREE**

FREE

Your jobber wants to sell you the BEST Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a can under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a can of PEP for testing purposes. I will let you know the results of this test.

JOBBER'S O. K.

Please send the party whose name is written above a trial can of "PEP."



WORCESTER ABRASIVE CO.

1662-1664 Broadway

New York

Radd Spark-Plugs Involve New Principle for Ignition.

In the Radd spark-plug, its manufacturer feels that he is offering a product possessing advantages which will readily be appreciated by those looking for a genuinely satisfactory spark-plug.

Among the many interesting claims advanced for this spark-plug are:

That, because of the better ignition, it will make an engine miss less, particularly when pulling

with a load with a truck or tractor, or when going up grade with a passenger car; will make the engine run cooler, more smoothly, and with less vibration; and will remain freer from carbon and oil deposits.

All of which, believes the manufacturer, proves that there is no simpler, easier, or cheaper way to improve ignition than by using the Radd spark-plugs.

It is said, also, that the Radd

spark-plug embodies a principle which has not been used heretofore, this new principle consisting of a small spark, produced in advance, which aids the discharge of the main gap.

On the end of the porcelain insulator there is attached a metal cap having a star-shaped hole through which the center wire—also known as the center electrode—passes. This metal cap is called the auxiliary electrode. It is made of nickel alloy which will stand an exceedingly high temperature, far in excess of that encountered in gas engines.

This charged electrode or metal cap will produce a very small spark between the sharp points of the metal cap and the center wire or center electrode. This small spark has a marked effect on the main spark-plug gap, thereby producing a larger and hotter spark.

This is exactly what occurs in the Radd spark-plug. In other words, it simply makes it easier for the current to jump over the spark gap because it reduces the resistance to the current. The action is similar to reduced friction or resistance produced by putting oil in a bearing.

It is said that the Radd spark-plugs, in an exceedingly ingenious and practical way, provide means for the ionization of the gas in the main gap, causing the current to discharge at a lower voltage and so overcoming almost entirely the difficulty known as "lag of the discharge."

In making the Radd spark-plug, the

famous "775" porcelain has been used, the claim being that this porcelain is unaffected by heat, will not soak oil, and is not injured by excessive vibration.

The center and auxiliary electrodes in Radd porcelains are of a special alloy, which, it is said, will stand a temperature of 3,000 degrees. For this reason, the Radd spark-plug is said to be especially desirable for tractors.

These spark-plugs have been tested by the U. S. Bureau of Standards, and they are further backed up by the guarantee of the manufacturer. When you write to the Leich Electric Co., Genoa, Ill., for further details, don't forget to mention the American Garage & Auto Dealer.

Glaring Headlights Dangerous—Shaler Affords Protection.

The Shaler roadlighter is said to be distinctive in that it distributes all of the light from the headlamps over a carefully chosen area of the road. A great many automobile engineers have expressed their satisfaction with this driving light.

It is claimed that this roadlighter throws a light on the road which looks as if it came from a pair of regular headlamps plus a pair of spotlights. The distance light is as strong or stronger than with plain glass, and there is an especially brilliant illumination of the edges of the road that enables the user of this lens to see plainly, even while passing other cars with headlamps that glare.

This remarkable efficiency is due to the fact that the Shaler roadlighter divides the light into three overlapping beams which are thrown toward the road at different angles so as to give a broad, smooth light for the first hundred feet and a narrower, intense light far into the distance.

The manufacturer states the efficiency of the Shaler as a glare-stopping device has been proved beyond a question by its receiving the highest candlepower rating allowed by law in every official state test.

An almost unanimous demand in a few of the states which have recently adopted the standard headlamp law has, up to the present, taken the entire output of the manufacturers, the Shaler Co., Waupun, Wis.

This demand has prevented the company from introducing it generally. Ample production has finally been assured and prompt deliveries are now being made.

There is scarcely anything that is more annoying to the motorist than having to contend with glaring headlights. Undoubtedly many of your customers have been wanting just such a device, for their cars.

The Shaler company will gladly supply any further details desired upon request. When you write to it, please mention the American Garage & Auto Dealer.

Knu-Lac Top Dressing and Gloss Black Enamel as Sales Aids.

"Human nature is a funny thing," remarked the Keen Observer, as he refilled his pipe and tilted his chair comfortably back against the wall of the garage. "They say that 'clothes don't make the man' and that's the truth, of course, but Bob Reilly the Newcomer tractor company's crack salesman up north, learned a new angle of the old 'saw' the other day that he says he will surely never forget."

His listeners settled themselves in their chairs, for their knowledge of the Keen Observer told them that they were going to hear something good.

"You all know old man Close, the rich old farmer over east of town who owns about half the county. At least, you've all heard of him. Well, Reilly was all set to sell the old man a couple of new tractors. Now Reilly's only rival in these parts is that young Art. Simms who sells the Speed-away tractors.

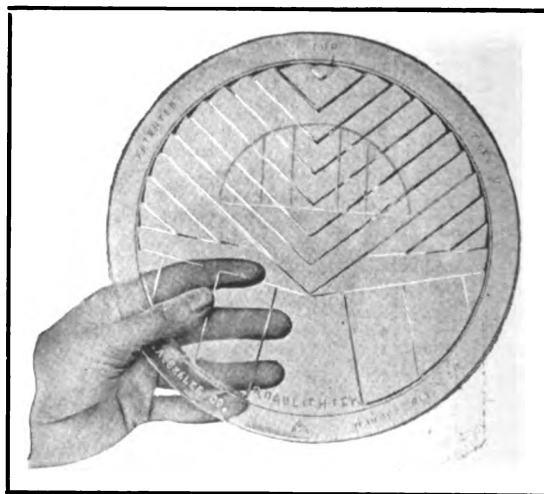
"Reilly knows he has a bit the edge on Simms because he really has the better article, but Simms is an 'up and comer' all right, so Bob was a little uneasy when he found that Simms had gotten in ahead of him on seeing old man Close. Still, he figured that old Close was too shrewd a fellow to be sold on the first visit and was confident that he could convince him that he had the better tractor.

"Well, bright and early one morning he started out in that old gas wagon of his to see Close. And right here I want to say that, as good a salesman as Bob is, he ought to know better than to try to sell anyone when he's traveling around in a bus that looks like that. Easy enough to fix it up too.

"Anyhow, to make a long story short, he drove out to the Close place, gave the old man all his best sales arguments, and left without being able to get the old chap to commit himself one way or another. Bob said he thought he had him sold at that, until about a week later when he learned that Close had placed his order with Simms for two Speedway tractors.

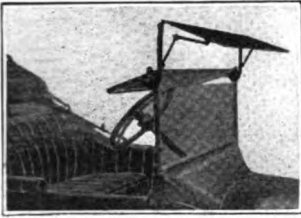


An Auxiliary Electrode Aids Ignition.



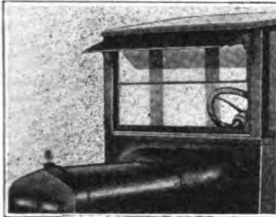
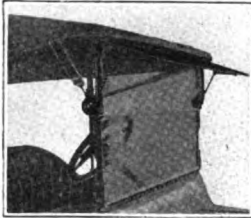
Stop Glare With a Shaler Roadlighter.

LOUDON ADJUSTABLE Storm & Sun Shade for Ford Cars



Top Up—with
Windshield
Closed

Top Down—with
Windshield
Open



On Closed Car

It Isn't What You Pay It's What You Get

Read This Letter

A better shade cannot be purchased at any price. The LOUDON has all the advantages of the \$15.00 to \$25.00 shades and none of the disadvantages of the cheaper ones.

More money invested may get one with more trimmings and tricks—more dingamabobs that cost money—but for practical purposes—for efficiency—utility—usefulness and appearance—the LOUDON leads them all.

BECAUSE—

Easily and quickly attached. Does not sag or flap. Free from rattle. Steel frame reinforced. High quality—sun-proof—rain-tight material. Allows free opening of windshield and raising and lowering of top. Adjustable to any angle without leaving car. Made so water does not drip over back onto windshield. Improves the appearance of any car.

SECURE—SUBSTANTIAL—RIGID.

Lasts the lifetime of the car. Made right. Priced right—guaranteed.

DEALERS, write for our proposition. There is big money for you in pushing the LOUDON. We help you with attractive advertising matter.

LOUDON—INCORPORATED

Manufacturers, Distributors Automatic Specialties
Desk A. 107 Western Avenue

MINNEAPOLIS,

MINNESOTA

Omaha, Nebr.,
February 22nd, 1921.
Loudon, Incorporated,
Minneapolis, Minn.
Dear Sirs: Received Storm and
Sun Shade O. K., and I am very
much pleased with same. I
wouldn't take Twenty Dollars for
mine right now.
Thanking you, I am,
Yours very truly,
(Signed) WILLIAM D. CAPE.

Try it and
you'll buy it.
After ten
days' use if
you are not
satisfied re-
turn the
shade and
get your
money back.
Dealers are
authorized to
make this
guarantee.



An Oplex Sign Gives a Showroom Personality

THERE is a certain distinction in the raised snow-white glass letters of an Oplex Electric Sign which means a lot to the showroom or garage. They are perfect day signs as well as night signs—raised, snow-white glass letters on a dark background. They have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing
an Oplex Sign to meet the par-
ticular needs of your business.

FLEXLUME SIGN COMPANY

25 Kail Street

Buffalo, N. Y.

"And here's the funny part of it. Bob was curious to know just why he lost that sale, so he put a friend of his up to asking Close how he came to buy of Simms instead of Bob—and what do you think his answer was? He said he 'figgered' that a fellow that wasn't making enough to drive anything better lookin' than the old rattletrap Bob drove couldn't be selling for a first-class firm, so he bought of Simms.

"Now, the fact of the matter is that, in point of years, the car Simms drives has seen fully as much service as Bob's, but young Simms had a happy thought a few weeks ago and made his old bus young again by having a coat of Knu-Lac Ford top dressing applied to the leather top and the rest of the car refinished with gloss black enamel. So, when he went out to see the old man, he was all spick and span.

"Bob says the part that gets him is that an old cuss like Close who pays so little attention to the appearance of his place, with all his money, would think about what the salesman looked like, let alone his car. But it just goes to show you that it pays to keep your car as well as yourself looking prosperous if you want to sell 'em.

"Biswell, who sells the Knu-Lac and gloss black enamel in this locality, tells me they are making a great hit with the people hereabouts. He says the Knu-Lac top dressing when applied to any Ford rubber or imitation leather top will positively waterproof and re-rubberize it. He says it seems to put back something which has gone out through deterioration and gives the top that original pliability and wearing quality, producing a rich gloss black, durable finish.

"With the gloss black enamel, the entire car, except, of course, the upholstery and the top, can be refinished. This black enamel spreads and covers evenly, Biswell says, and so provides an enamel which the amateur can safely apply to his car with the assurance of producing a good job. Naturally enough, that makes a hit with the car owners, since they can do the work themselves and save a few of the dollars which aren't quite so plentiful just now as they were a while back. Another nice feature of this enamel is that it dries over night in a warm place."

"You sound like an agent for the stuff," laughed one of his hearers.

"No," answered the Keen Observer, thoughtfully, "but I shouldn't mind being. Biswell tells me he's making wonderful sales. He is the only representative of the Auto Specialties Co., the manufacturers of the Knu-Lac and gloss black enamel, and both are proving so satisfactory that he says he has a hard time keeping all his orders filled."

Write the Auto Specialties Co., 40 Elm St., Buffalo, N. Y., for full details con-

cerning these excellent new preparations for giving new life to old Fords, and be sure to mention the American Garage & Auto Dealer when you write.

The New Stiles Signals That Warn Without Frightening.

The Stiles Mfg. Co. is making an explosion whistle for passenger cars and trucks that is distinctive in that it can be adjusted to any tone. The adjustable feature makes it possible to get the tone regardless of the compression of the motor. It is



This Signal Warns Without Frightening.

installed in place of the priming cup, except on Ford cars, where it is installed with a special adapter to be used in connection with a regular spark-plug. An adapter is furnished with every whistle.

There are no holes to drill. No mechanical work is necessary. The whistle operates by a cord attached to the dash or steering wheel column.

Write the Stiles Mfg. Co., 4423 Gravois Ave., St. Louis, Mo., for further details.

BOOK REVIEWS.

STORAGE BATTERIES—A Handbook on the Storage Battery for Practical Men, by C. J. Hawkes. Published by The Wm. Hood Dunwoody Industrial Institute, Minneapolis, Minn. 157 pages, 6 ins. by 9 ins., completely illustrated; price \$2.

To those familiar with the work of the Dunwoody Institute and with the publications issued by it, little need be said regarding this new and interesting treatise on storage batteries. The book was worked out, before publication, in the form of lesson sheets by a competent instructor in the institute. The author has had many years of experience in electrical work, particularly with storage batteries, and has served for a number of years as an instructor of evening classes at Dunwoody.

The work is written from the standpoint of the tradesman and seeks to furnish him in thorough-going but simple form, the technical and practical information about storage batteries which will enable him to meet the demands of his trade. The book is made up in the form of 15 lessons, with a short list of questions at the close of each lesson in order that the reader may test his knowledge of what he has read.

The first lesson takes up primary and secondary batteries and battery use, and the description of the storage battery and its parts. Succeeding lessons take up in regular order the following subjects:

History of the storage battery; chemical action; lead cells, and their characteristics; nickel-iron cells and characteristics, and storage battery efficiency. All this has to do with the theoretical side of the storage battery.

The practical side of storage batteries is considered under the manufacture of parts—assembly and electrical treatment; care and operation; tests and inspection; internal symptoms; repairs; storage; design of batteries; and auxiliary apparatus, such as direct current control, alternating current converters, rectifiers of various types, rotary converters, lead burning, meters, hydrometers, thermometers, voltmeters, ammeters, ampere-hour meters, tools and testing devices.

Particularly to be noted is the analysis of the work by chapter heads and sub-heads, the illustrations, the clear explanations made, the treatment of trouble-shooting, and the splendid analytical chart of storage battery troubles and remedies to be found at the close of the book.

In short, it is a comprehensive treatment of batteries and battery troubles which automotive men will undoubtedly find both interesting and helpful.

AUTOMOTIVE IGNITION SYSTEMS, by Earl L. Consoliver and Grover I. Mitchell. Published by McGraw-Hill Book Co., New York, in both loose-leaf and book form. 269 pages, 6 ins. by 9 ins., 345 illustrations; price \$2.50.

The ten chapter headings of this book, which was prepared in the extension division of the University of Wisconsin, discuss in detail principles of electricity and magnetism, ignition batteries, the jump-spark ignition system, modern battery ignition systems, battery ignition systems for multiple-cylinder engines, the low-tension magneto, modern high-tension magnetos—armature and conductor types—care and repair of ignition apparatus, and ignition troubles and remedies.

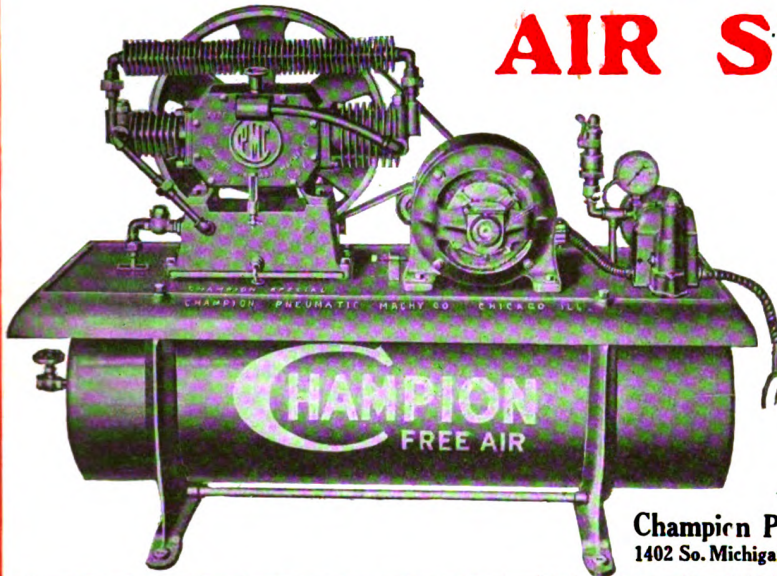
This book is intended to present a systematic course of study dealing with the ignition systems used on automobiles, trucks, tractors and airplanes. The principles of operation and the construction of modern ignition systems are clearly explained. The care and repair of ignition apparatus and the remedies for ignition troubles are thoroughly discussed.

Rules for timing of battery ignition systems, for the securing of proper performance of ignition systems, and for magneto timing, are given, together with wiring diagrams for the following typical systems: Atwater Kent Type CC; K-2; Berling Magneto; Bosch Dual; Connecticut Type H; Delco; Cadillac Eight; Liberty Aircraft; Oldsmobile Eight; Packard Twin Six; Pierce-Arrow; Eisemann G4, GR4; Ford; K-W magneto; low-tension magneto; Philbrin; Remy; Splitdorf Aero magneto; Simms magneto; Dixie magneto; low-tension dual; Wagner; Westinghouse, etc.

All those who install, adjust or repair ignition systems in the factory or repair shop, as well as automobile owners, will find a large amount of valuable and helpful information in this new publication.

Business is always good
for the garage that gives

CHAMPION AIR SERVICE



Motorists and truck drivers invariably stop for air at the place where they know they can get quick and dependable service. And for gas, oil and supplies they naturally go to the same place.

The Champion Air and Water Stand is the latest and most satisfactory means of supplying free air. Handsome, attractive, automatic and positive in action. No accidents—when hose is released it returns *gradually* to its normal vertical position. CHAMPION AIR COMPRESSORS combine incomparable service with extremely low upkeep cost. Made in many types for every need.

WRITE FOR OUR LITERATURE. Dept. A

Champion Pneumatic Machinery Co.
1402 So. Michigan Ave. CHICAGO



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

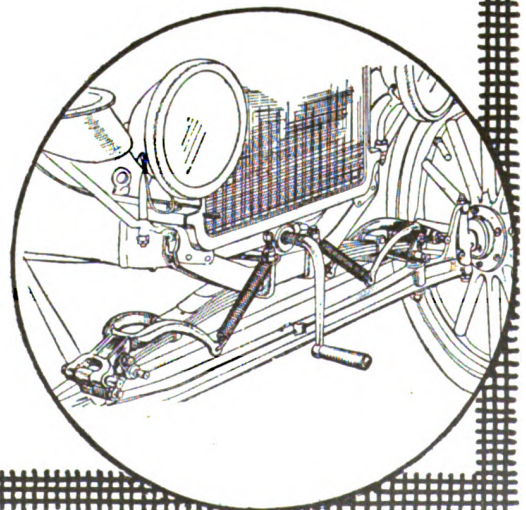
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.

In Canada—RICHARD WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Here and There in the Motor World

Epigrams Made Famous by the Boy and His Slate.

One of the cleverest boys in the country can be seen any day standing around the filling stations of the National Refining Co., where White Rose gasoline is sold. You undoubtedly have seen this boy, smiled at the witticisms written on the big slate which he holds in his hands, and wondered where all of the "peppy" epigrams came from that appear with such regularity.

These are from the pen of Charles L. Archbold, advertising manager of the National Refining Co., who also originated the sign. In speaking of these epigrams recently Mr. Archbold said:

"When we first started using this idea to get the attention of motorists to White Rose gasoline stations, we didn't figure on it becoming so popular in so short a time. We didn't mind so much when actors, preachers and orators appropriated these epigrams, but when merchants in every line began using them as their own to boost their business, we found it necessary to have them copyrighted in order to protect ourselves."

Mr. Archbold has prepared hundreds of these witticisms, a few of which are given here:

The public be "jammed"—in the street cars.

The raisin' of the rent has the "kick."

If you have two teeth—be thankful both hit.

A four-party line is convenient for the other three parties.

Many are dead but they won't lie down.

Automotive Equipment Association Holds Mid-Convention Meeting.

The mid-convention meeting of the Automotive Equipment Association was recently held at the Congress Hotel, Chicago.

Among the many things accomplished at the gathering a show committee was appointed to look after and handle the matters incident to the annual show of automotive accessories, which will be held at the Coliseum in Chicago in November. The committee consists of the following members:

N. H. Oliver, chairman, Illinois; Wm. Von Elm, vice-chairman, New York; Chas. C. Gates, Colorado; W. E. Wissler, Iowa, and W. H. Parkin, of Michigan.

The association recently established a

freight and traffic bureau which reported that there were 790 claims sent in amounting to \$4,023, and it is fair to assume that over 95 per cent of this amount will be saved for the members.

Owing to the resignation of Ivan Goodrich of Pennsylvania, as director, George L. Brown of Pennsylvania was elected to take his place.

A committee was appointed, of which President Stranahan is chairman, to review business conditions and evolve plans for stimulating and promoting more harmonious business relations and feelings between the manufacturer and the jobber, and the expanding of trade in general, including the dealers. This committee is to report further on this matter at the Mackinac Island convention to be held in June.

Arrangements have been perfected to take members of the association from the Southwest, West and Northwest to Mackinac Island, by boat from Chicago, leaving approximately June 18. Similar plans are being made to afford like transportation from New England and the East, to board steamship at Buffalo, Cleveland or Detroit.

Stark-Inland in New and Large Manufacturing Quarters.

Optimism and a full-speed-ahead policy for 1921 have been adopted by the officers and employees of the Stark-Inland Machine Works, manufacturers of the famous Stark-Inland spiral cut one-piece piston ring, who recently celebrated the fifth anniversary of the company by removal to new and larger quarters.

History has been made by the company ever since it was organized in the early part of 1916. The original force consisted of 20 workmen who were employed in modest quarters occupying less than 3,000 square feet. Today the Stark-Inland one piece piston ring, to the number of 6,000,000, is used in practically every part of the world; in fact, wherever automobiles, trucks, tractors, motorcycles, locomotives, stationary gas engines, marine engines, air compressors, refrigerating machines, airplanes and mining machinery are used.

To accomplish the phenomenal results obtained for this product, credit is given by the management to advertising as being largely responsible.

The new plant facilities cover more than 70,000 square feet of floor space, and sev-

eral hundred highly-skilled workers are employed to take care of the demand for the product. The management started in business with a capital of \$30,000, while the present capitalization is \$2,000,000.

Not content with the success of the spiral-cut piston ring, the management recently developed the Stark oilless, a popular-priced, quick-seating piston ring placed on the market to enable dealers to supply the demand for a ring of this type. The oilless was placed on the market four months ago, and the sales have already totalled several hundred thousand.

This ring is said to be made on an entirely new principle—having the turned finish or quick-seating feature fully developed. The manufacturers say that it adapts itself quickly to the contour of the cylinder by wearing in with less delay. The oil groove assures proper distribution of lubricant, while the auxiliary groove at the shoulder "scrapes the oil down." The oilless is manufactured under the same strict supervision as applied to the Stark-Inland one-piece piston ring.

Coincident with the removal to new quarters, the company announced that it has absorbed the Shurnuff Mfg. Co., of St. Louis. With the addition of the Shurnuff products, the Stark-Inland organization now offers to the trade a varied line of automotive products.

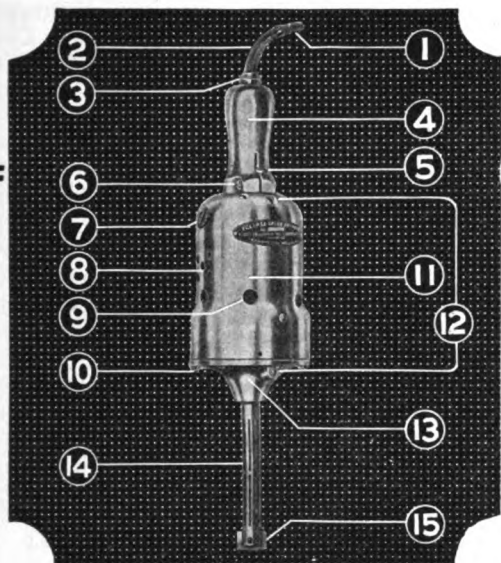
In addition to the new facilities the company will continue to use the old factory as a tool factory.

Further information concerning any of



Growing Business Gives Stark-Inland New Quarters.

its products can be obtained from the Stark-Inland Machine Works, St. Louis, Mo. When writing, please mention the American Garage & Auto Dealer.



These features tell the story of ECLIPSE superiority

1. Flexible Cord
2. Wire Cord Protector
3. Cord Clamp Nut
4. Detachable Handle
5. Trigger Switch
6. Handle Clamp Screw
7. Accessible Brush Holders
8. Motor Ventilating Holes, Intake
9. Motor Ventilating Holes, Exhaust
10. Six Flange Screws
11. Main Housing
12. Oilers for Three Bearings
13. Cover Flange
14. Oscillating and Rotating Shaft
15. Valve Bit

ECLIPSE ELECTRIC VALVE GRINDER



In performance, as well as in construction, this tool stands in a class by itself.

The ECLIPSE reduces the time and labor required for grinding valves to such an extent that the profit on each job is greatly increased.

It takes only a minute or so to produce a perfectly smooth valve face and seat—absolutely gas tight. The slow rotation insures an equal amount of treatment to every part of the surface and the rapid oscillations prevents grooving and scoring.

The ECLIPSE VALVE GRINDER is a light, portable, electric-driven tool with ample power to grind all sorts of automotive valves without overstraining.

All moving parts being of bronze or heat-treated steel alloys, grease packed or accessible for oiling, insures a long service life.

Write for circular and prices

ECLIPSE VALVE GRINDER CO.
Dept. C. 20th St. at Oak, Kansas City, Mo.



Fires on less voltage than any other plug

Numerous tests on many makes of cars show that the RADD requires only 50 to 60 per cent of the voltage necessary to fire any other spark plug. This means economy of current consumption and also that the RADD will fire consistently where other plugs fail.

The RADD Spark Plug is made on a new principle that sets a higher standard of spark plug service. This principle consists of a small spark being produced in advance, aiding the discharge of the main gap. A larger and hotter spark is the result and ignition improved accordingly.

THE RADD is
The Only Plug that eliminates the time lag of the spark.

The Only Plug with Auxiliary electrodes that assist the discharge of the main gap.
The Only Plug that will cause ignition at a lower voltage.

The RADD Spark Plug makes the engine miss less and run cooler and smoother. It remains freer from carbon and oil deposits due to better ignition. Equipped with the famous "775" porcelain, which does not soak oil and which is uninjured by excessive vibration.

THE RADD SPARK PLUG is guaranteed by us to be free of all defects in materials and workmanship—also electrical and mechanical defects.

Made in many types for all automotive requirements.
DEALERS—When selling spark plugs why not sell the best. Send in the coupon today and learn all about the RADD.

LEICH ELECTRIC COMPANY
GENOA ILLINOIS

Leich Electric Co.,
Genoa, Ill.

Please send us complete information and trade prices on RADD Spark Plugs.

Name _____

Address _____

Piston Pin Manufacturer Issues Valuable Specification Chart.

A manufacturer of piston pins and other automobile parts has devised an aid to jobbers and dealers that has proved of great value to the trade. This is in the nature of a specification chart which describes the pins that can be furnished from stock or made to order.

The latest chart, dated January, which is now ready for distribution, contains a list of pins available for passenger cars and trucks with Continental motors. It also lists push rods manufactured for Overland cars and valve lift assemblies manufactured for Buicks.

In addition, it contains particulars of manufacture, packing and shipping, and

gives prices and credit rules and a list of branch offices maintaining a complete stock of pins. The stock list itemizes the manufacturer's stock number of pin, the car manufacturer's part number, make of car, year, model, make of motor, description of pin, size of pin and list price.

The specification chart thus tabulates all information regarding the product that might be needed by the jobber or dealer, and can be used in ordering a stock of piston pins.

This specification chart can be obtained on request from the Burgess-Norton Mfg. Co., of Geneva, Ill. When you write the Burgess-Norton company concerning this chart, be sure to mention the American Garage & Auto Dealer.

"Better" Spring Bumpers Are Shipped to the "Four Corners."

An unusual shipment of "Better" spring bumpers has just been made by the New Era Spring & Specialty Co., of Grand Rapids, Mich., in a carload for export customers going to 10 different foreign ports:

Algoa Bay, Gold Coast and Africa; Durban, Africa; Sydney, Australia; Port Elizabeth, Africa; Buenos Aires, South America; Manila, Philippine Islands; Batavia, Oceania; Tauranga, New Zealand; Bogota, Columbia; and Nicaragua, Central America.

The New Era organization states that the capacity of its new plant continues to be taxed to its utmost and plans are being arranged for doubling the output.



**"LITTLE GIANT"
GEAR AND WHEEL PULLER**

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

Liberal Discounts to Dealers.

Premier Electric Co.
3800 Ravenswood Ave., Chicago, U. S. A.

**KENNEDY
Auto Storage Covers**

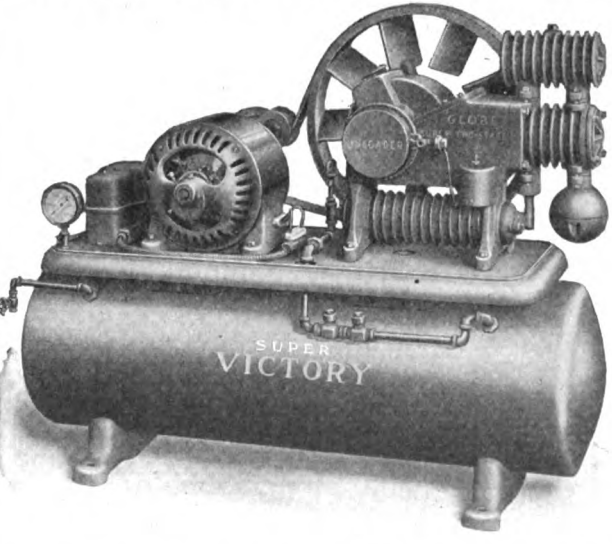
furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock, Ont.

Harvey
RACINE
BOLTLESS
AUTOMOBILE
SPRINGS

Easy Riding
Guaranteed
HARVEY SPRING & FORGING CO.
1044 17th Street
RACINE - WISCONSIN

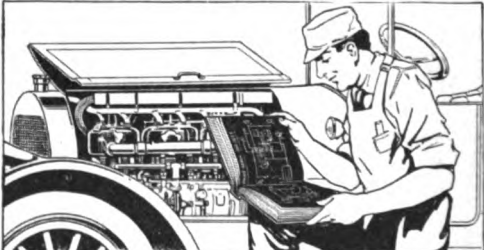
SUPER TWO-STAGE MOTOR-DRIVE COMPRESSOR UNIT



A NEW TYPE COMPRESSOR designed especially to handle Giant Pneumatic Tire Service and all other heavy-duty requirements up to 350 pounds.

Bulletin describing complete line of sizes and equipments on request.

GLOBE MANUFACTURING CO.
BATTLE CREEK, MICHIGAN



Is A Wiring Job A Guessing Contest?
NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and strangers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car or truck since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

The profits on the first half dozen jobs the Manual shows you how to do are more than enough to pay for it. The rest of its big dividends are velvet. And the price is only fifteen dollars, delivered anywhere. Put a check in an envelope and start it to us right now.

AUTOMOTIVE PUBLISHING CO.
448 S. Dearborn St., Chicago, Ill.
41 E. 29th St., New York
Suite 924, No. 13 Tremont St., BOSTON, MASS.
N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England. Motor Technique Bureau, 149 Strand, W.C. 2

"Our Dealers Need Never Have a Dollar's Worth of Dead Stock"

The I. J. COOPER RUBBER CO.
DISTRIBUTORS OF

NEW ERA SPRING AND SPECIALTY CO.,
Grand Rapids, Michigan

CINCINNATI, OHIO
March 4, 1921

Gentlemen:

Responding to your recent inquiry we are pleased to say that we have handled your New Era Better Spring and Bumper for the past three years with the very best of satisfaction both to our customer and ourselves from a business and profit making standpoint, and we certainly are going to continue New Era bumpers for the coming year much more vigorously than heretofore.

We have decided to handle but one other make, believing that we can serve our trade satisfactorily in the majority of cases with the New Era.

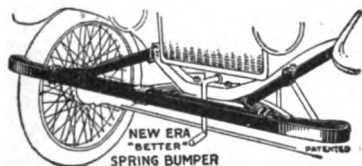
What appeals to us and our dealers, outside of the actual merit of the bumper is the interchangeability of arms, which calls for less stock investment and the big fact that we and our dealers need never have a dollar's worth of dead bumper stock, it being easy by your free exchange method of arms to return to you any slow sellers for arms that we may have called for to fit some certain car, particularly the rears which your line so thoroughly covers.

Assuring you that we have appreciated your service and cooperation, we are

Cordially yours,
THE I. J. COOPER RUBBER COMPANY
By *H. H. Bunker*
General Sales Manager

B:H

Here are all the generous profits of the bumper business with none of its grief—a product of unequalled merit, easily handled and involving the minimum of investment.



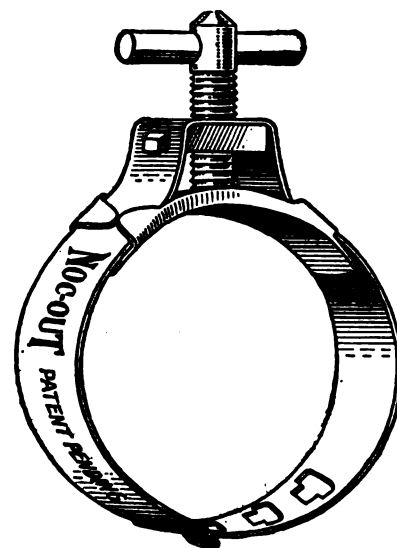
The New Era "Better" Spring Bumpers move fast because they possess so many plainly apparent points of merit that the car owner sees their superiority at a glance. Write for descriptive literature and dealers' discounts.

New Era Spring & Specialty Co.
56 Cottage Grove Ave., Grand Rapids, Michigan

NEW ERA

"Better" SPRING BUMPERS

The Latest Invention in Design and Construction of HOSE CLAMPS



The "Noc-Out" Hose Clamp is a money-saving article. It is a one-piece clamp, made to fit two or three sizes and any thickness of hose connection; can be applied without a tool and the construction is such that it does not cut or buckle the hose.

It is made in eight sizes, ranging from $\frac{1}{2}$ " to $3\frac{1}{4}$ ", inclusive.

Garagemen find it profitable to use this clamp in their repair department; also to carry a supply for resale purposes. A display board furnished without cost.

AUTOMOBILE REPLACEMENT COILS FOR ALL STANDARD BATTERY SYSTEMS

Our Replacement Coils are designed to interchange with all standard battery ignition systems. Brackets, terminals and connections make them readily adaptable to all cars.

Every cell is thoroughly tested under high pressure. They are made of the best material possible to obtain and assembled by experienced and careful workmen. Guaranteed one year. Write for specifications and prices, also our special proposition. It will save money for you.

R. T. MFG. & SALES CO.

Factory:
Green Bay,
Wis.

Sales Dept.:
3847 W. Madison,
Chicago, Ill.

FATTEN YOUR PROFITS with the **ROMORT** **AIR and WATER STATION**



Fat profits in 1921 are going to the live and aggressive two-fisted dealer who has adopted "Go get 'em methods," advertises effectively and renders first class service with up-to-date equipment.

The clean, quick and efficient air and water service rendered by the Romort will bring hundreds of new customers to your door, increase business, multiply sales and fatten profits.

It gives the motorist the habit of stopping at your shop and that is where he is going to buy his gas, oil, tires and supplies. The Romort is built in five styles—Curb, Wall and Ceiling—a model for every requirement.

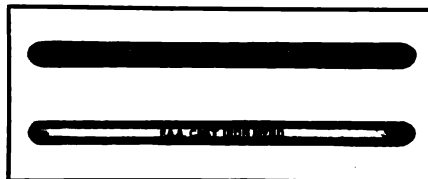
Write our sales dept. today for descriptive circular.

Manufacturers
The Romort Mfg. Co.
Oakfield, Wis.

Sales Dept.
THE ZINKE CO.
1323 Michigan Ave.,
Chicago

Made by the makers of the famous Romort Air Products

NEW WELDING and **SOLDERING Compounds** "Perfect substitutes for Acetylene Welding"



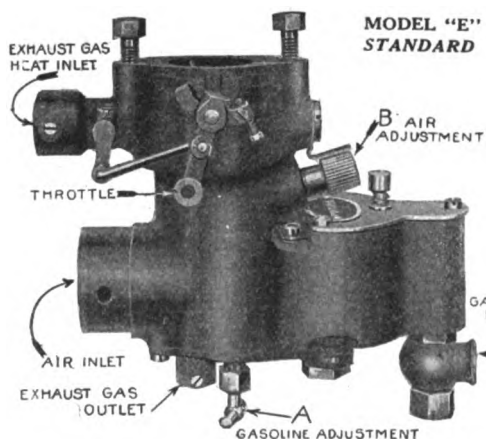
F. A. A. ALUMINUM and **CAST IRON MENDS**

Used to repair defective or scored cylinders, cracked water jackets, crank cases and other aluminum or iron parts.

Send for trial order and directions

DEALERS:—Write for territory and terms

F. A. ALBERTUS & COMPANY
206 9th Street Milwaukee, Wis.



MARVEL CARBURETERS

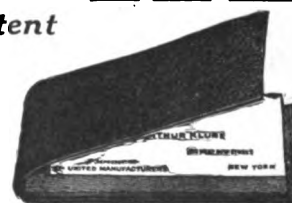
GIVE
Universal Satisfaction
POWERFUL—
ECONOMICAL—
SIMPLE—

Write for our new Catalogue
MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

Salesman or **Sales Manager**

WHETHER you are a salesman or a sales-manager, a general manager, an officer or a director of your company, you should be represented by a good card—**THE BEST CARD.**

Peerless Patent
Book Form
Card



Appearance of our neat card in case

That they are the best, admits of no discussion. The best men everywhere use them. If you don't it is only because you have not examined them. They are always carried together and they carry conviction. They are always smooth edged when you detach them, and they are always clean and flat. They leave nothing to be desired, however fastidious the taste, or severely critical the judgment.

Send today for sample tab and detach the cards one by one—satisfy yourself as to what others universally call best. Send today.

John B. Wiggins Co.
Engravers, Die Embossers, Plate Printers
122 So. Michigan Ave., 1104 So. Wabash Ave.
CHICAGO

Our Bearing and Lubricating Experts Are at Your Service

to assist you in any bearing troubles. Ship us one by parcels post—one of your own bushings—and we will treat it and return it next day without cost to you. Test it on your own work. We guarantee a saving of 80% to 90% in your lubricating oils on any service.

Designing
Developing
Detailing **OF**
Delivery

Experimental Work and Models for Inventors and others.

Air and Ammonia Compressors, Tractors and Accessories, Automotive Trucks, Power Transmission, Clutches and Gearing.

Internal Combustion Engines for any fuel from crude oil to gasoline, either two-cycle or four-cycle, and for any purpose from farm to airplane engines.

Filtering Systems for lubricating oils or gasoline piping.

Labor saving devices.

Concrete Tanks for any liquid.

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NOW IS THE TIME

to fix up your old engine

We specialize on engine work, particularly two-cycle marine, while laid up for the season

Peerless Engineering Co.

EXPERT ENGINEERS

Lock Box 1472

Cincinnati, Ohio

Handle Grease Easily — Swiftly — Cleanly with an **O'BRIEN** Heavy Duty Grease Pump

The easiest and quickest operating grease Pump on the market.

Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil.
Capacity 125 pounds or 15½ gallons oil.

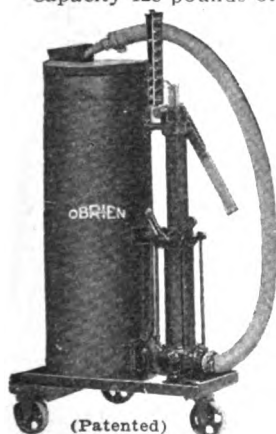
Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

IT DOES YOUR DIRTY WORK

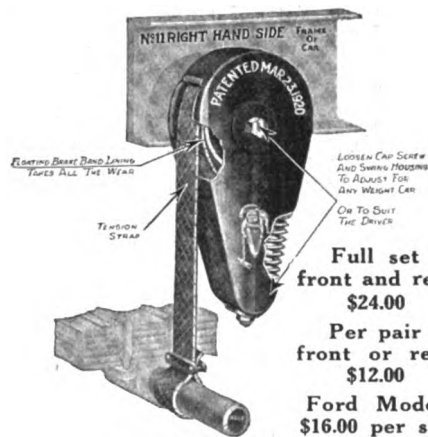
Ask your jobber about them or write us for complete information.

**The
Grease Pump Mfg. Co.**
1500 Michigan Blvd.
Chicago, Ill.



(Patented)

Every Road a Boulevard when a car is equipped with "BULL DOG" BOUNCE ABSORBERS



Full set
front and rear
\$24.00

Per pair
front or rear
\$12.00

Ford Model
\$16.00 per set

FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE. Easily attached; needs no oiling; has no metal parts that will wear or break.

JOBBER! DEALER! Write for liberal discounts.

CHANNON-HUGHSON COMPANY
225-231 West Erie Street CHICAGO, U. S. A.

There Is Money in CRANKSHAFT WORK

PROOF

(Are you interested in Profits
and satisfied customers?)

with
the
**WEBER
TOOL**

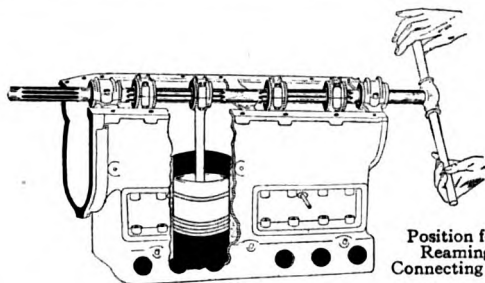
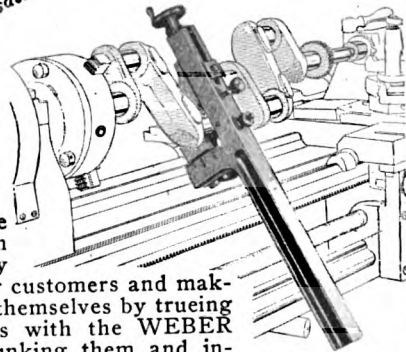
**SEND FOR
THIS BOOK~**
It will tell you.

How garages, machine shops and repairmen all over the country are saving money for customers and making more money for themselves by trueing up worn crankshafts with the WEBER TOOL instead of junking them and installing new ones.

With one setting of the crankshaft on centers' you can turn all crank-pins with the WEBER TOOL absolutely round and straight to factory standards, spending not more than ten to twenty minutes per pin.

At your jobber or write direct.

SAWYER-WEBER TOOL MFG. CO.
342 So. Alameda St. Los Angeles, Cal.



Position for
Reaming
Connecting Rods

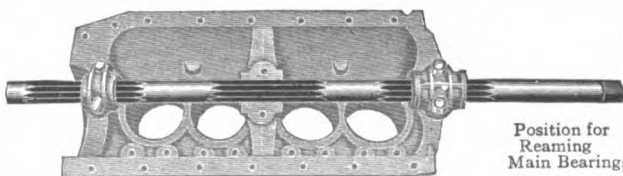
The LEWIS REAMER Multiplies Profits

in more ways than one. It takes only an hour and a half to ream the seven bearings in a Ford motor as against eight hours by the hand method. Your labor cost is further reduced by the fact that you do not need a high priced mechanic to operate your Lewis Reamer. Any man in your shop can do satisfactory work on either connecting rods or main bearings.

Your customers will be highly pleased with the perfect work turned out by your Lewis Reamer. The first three jobs pay for it.

Ask your jobber or write us today for particulars.

LEWIS TOOL COMPANY
612 Fifth Ave., South Minneapolis, Minn.



Position for
Reaming
Main Bearings

GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company
1002 Washington Boulevard
Chicago, Illinois



J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

Audits, Investigations, Surveys, Systems
Income Tax Reports

Monthly Balance Sheets and
Operating Statements Prepared.
Unit and Process Costs Established.

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Phone Geneva 2811
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Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.

*We Specialize in Systems for Automotive
Dealers*



Make Your Windows Talk

Let the public know that you have something to sell. Don't expect the articles displayed in your window to speak for themselves.

Get busy—make your windows talk. Put a Unitype Sign in your window. Set it to work with the Unitype System of Salesmanship. It means quick turnovers and large profits.

The Unitype is a striking white-on-black quick change sign—listing anything you want in the way you want.

There are many styles to choose from. Send for

Catalogue "AG-20"
Applied to Auto Dealers

The W. L. Clark Co.

540-542 Pearl Street

New York



BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.

GREB AUTOMATIC GRIP PULLER

BEACH PATENT

Ample strength in Greb Pullers for all the heavy jobs

No matter what the work you want to do, the mighty jaws of the Greb Automatic Grip Puller will furnish unlimited power. The jaws adjust to the work instantly. The positive grip cannot unhook. A set of three long and three short jaws go with each Greb—really four pullers in one.

Grebs are adaptable to wide ranges of work. The three sizes handle every type of job that comes into the automotive shop. It will pay you to investigate this very profitable equipment.

Send for information on our garage tools and equipment and our 10-day trial offer; or ASK YOUR JOBBER.

The Greb Company

194 State Street, Boston 9, Mass.

The Greb Puller, senior size, with the three regular short jaws, removing counter shaft gear on Autocar transmission. All the power needed and plenty to spare.



BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

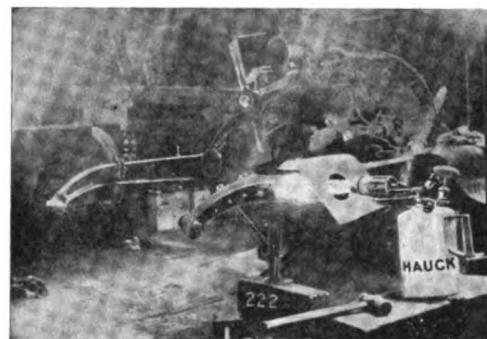
BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.



Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

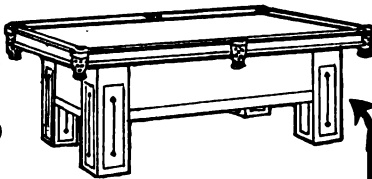
Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.

Billiard Tables



For Immediate Delivery

Large selection, highest quality "Pix" Billiard Tables. Also all other billiard parlor fixtures. Wood or Steel. Lowest prices. Estimates furnished. . . . Write for full catalog 6407.

ALBERT PICK & COMPANY
208 W. Randolph St., Chicago, Ill.

For Those Who Know and Want the Best

REYNOLDS SPRING CO.

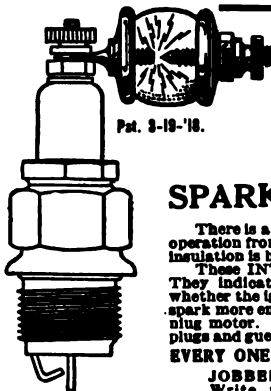
RED DIAMOND CUSHIONS FOR FORD CARS

A Perfect Product for Particular People

Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.
Sold thru regular channels only.

Manufacturers
The REYNOLDS SPRING Co.
JACKSON, MICHIGAN

Sales Dept.
THE ZINKE CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS



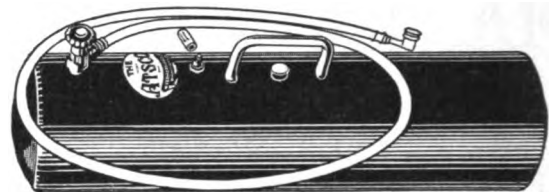
Pat. 2-10-'18.

Spark Plug Troubles Are Rare Occurrences on the car equipped with UNIVERSAL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon. These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM
JOBBERs and DEALERs—Your profit is liberal.
Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.
550 W. Harrison Street CHICAGO, ILL.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company Pittsburgh, Pa.



BEST BY TEST

AMERICAN ADJUSTABLE VALVE TOOLS

With these tools anyone can true to a perfect point of accuracy, any angle or degree—and size valve and seat 1" to 3" inclusive.

OVER 30,000 IN USE

Write for circular "B"

AMERICAN VALVE TOOL MFG. CO., 354 W. 50th St. NEW YORK

Car owners prefer

Graham Socket Wrenches

because they make repairs and adjustments easy, prevent broken parts and save time and temper. They are turned from solid bar stock and are heat treated. For strength and reliability they are unexcelled.

With a No. 2 Set in his car the driver is ready for any emergency.

DEALERS: Write for trade prices

GRAHAM ROLLER BEARING CO.

Coudersport, Pa.

Price \$1.75



ROSE GREASE BUCKET

For handling grease conveniently, quickly, without mess or waste, there is no equal to the Rose Fil-A-Gun Grease Bucket. Pumps grease through hose direct to point where needed. Or, one stroke of pump fills the Rose Taper Nozzle Grease Gun with which every Rose Grease Bucket is equipped.

DEALERS: Rose Grease Buckets, like Rose Tire Pumps, will increase your sales and make you good profits. Have your jobber send you complete information.

Frank Rose Mfg. Co.
Hastings, Neb.



When Springs Break, put on



VULCAN

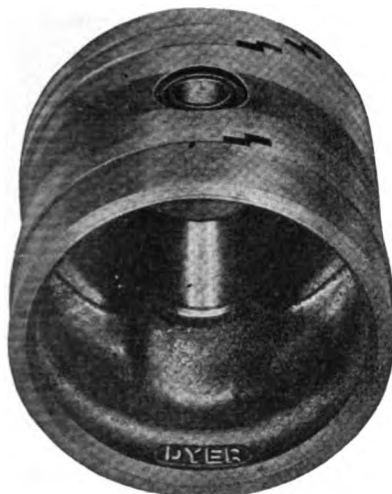
The Replacement Spring
Our metal nameplate is on every genuine VULCAN spring for your protection.

If your jobber cannot supply you, write us—today.

JENKINS VULCAN SPRING CO.
Richmond, Indiana.

PISTONS AND PINS

Finished — Semi-Finished



All Makes and Models of Pleasure Cars, Trucks, Tractors

Automotive and hardware jobbers buy Dyer Pistons because their dealers demand the best. Finished pistons include bushings if so designed. Semi-finished pistons have center grooves standard diameter and pin holes rough reamed with center marks.

LOOK FOR THE NAME

Each Dyer piston is individually packed and marked. Standard and .0025, .005, .010, .015, .020, .025, .031, .035, .040, .045 over-size. Semi-finished Pistons are .062 and Pins .020 over-size.

All Models—All Sizes

THE DYER COMPANY

CAMBRIDGE, MASS.

EVERY LIVE DEALER Should be acquainted with This Wonderful Device **ALSOP-ALL-SPARK**

Makes money for you and saves many dollars for the car owner



BEST BY GOVERNMENT TESTS

This simple, little device does away with Spark Plug and Carbon Troubles, pays its owner big dividends. Ask for copy of report showing severe U. S. Government tests.

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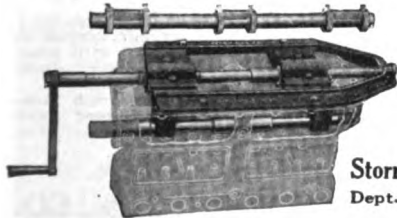
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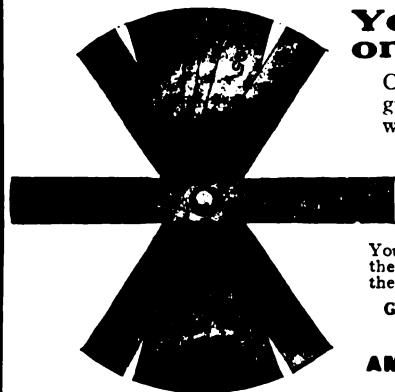
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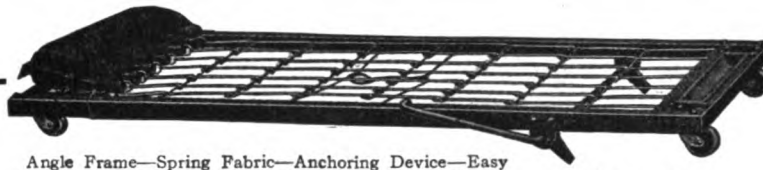
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Index to Advertisements

A		K	
Accurate System & Manifold- ing Co., Inc.	—	Kastens, Henry	—
Air-Tight Steel Tank Co.	56	Kennedy Car Liner & Bag Co.	50
Albertus & Co., F. A.	52		
All-Spark Ignition Co.	57	L	
All-Spring Shock Absorber Mfg. Co.	61	Laminated Shlm Co.	—
American Bolt & Screw Case Co.	—	.....Inside Back Cover	
American Valve Tool Mfg. Co.	56	Leich Electric Co.	49
Am-pe-co Sales Co.	57	Lewis Tool Co.	54
Atlas Auto Supply Co.	—	Loudon, Inc.	45
Atlas Mfg. Co.	56	Lourie Mfg. Co.	—
Auto Specialties Mfg. Co.	5		
Automotive Publ. Co.	50	M	
B		McDaniel Rubber Co., Leo.	—
Bailey Co., Geo. D.	—	Marvel Carburetor Co.	52
Beck & Corbitt	57	Marvel Machinery Co.	3
Boddy J. Newton	54	Motor Salvage Co.	58
Brewer Specialty Corp.	4		
Brunner Mfg. Co.	6	N	
Burd High Compression Ring Co.	57	National Cash Register Co.	41
Burgess-Norton Mfg. Co.	58	National Refining Co.	37
Butler Mfg. Co.	59	National Rubber Filler Co.	—
Butterfield & Co.	55	New England Mills Co.	—
		New Era Spring & Specialty Co.	51
C		Northern Trading Corp.	59
Catelain, Andre G.	59		
Champion Pneumatic Machin- ery Co.	47	P	
Channon-Hughson Co.	53	Paro, H. G. Co.	—
Clark Co., W. L.	55	Parts Service Co.	—
Comfeld Tire Protector Co.	—	Peerless Engineering Co.	53
Curran-Detroit Radiator Co.	5	Peerless Finishing Co.	—
Curtis Pneumatic Machinery Co.	27	Phillips, H. E., & Co.	—
		Pick & Co., Albert.	56
D		Premier Electric Co.	50
Davies-Young Soap Co.	—		
Dearborn Equipment & Hinc- ley-Myers Co.	33	R	
Dickerson, C. A.	35	Reynolds Spring Co.	56
Duntley, J. W.	—	Romort Mfg. Co.	52
Dunton Co., The M. W.	—	Rose Mfg. Co., Frank.	56
.....Back Cover		R. T. Mfg. & Sales Co.	51
Dyer Co., The	57	Rust Products Co.	62
E		S	
Eclipse Valve Grinder Co.	49	Shaler Co., C. A.	Front Cover
		St. Paul Welding & Mfg. Co.	59
F		Sawyer-Weber Tool Mfg. Co.	54
Fairbanks Co.	—	Schrader's Son., Inc., A.	61
Farmers' National Life Insur- ance Co.	58	Silpon Co., The	—
Federal Electric Co.	7	Smith Co., The W. J.	—
Finn & Co., W. M.	—	.....Inside Front Cover	
Flexlume Sign Co.	45	States Chemical Co.	8
Foster Bros. Mfg. Co.	59	Stiles Mfg. Co.	—
		Storm Mfg. Co.	57
G		Sunderland Machinery & Sup- ply Co.	—
Ganschow Co., William	54		
Garden City Spring Works	59	T	
Gem Novelty Co.	—	Tokhelm Oil Tank & Pump Co.	—
General Utility Co.	39	Trindl Co., The	59
Globe Mfg. Co.	50	Tungsten Mfg. Co.	—
Graham Roller Bearing Co., The	56		
Grease Pump Mfg. Co., The	53	U	
Greb Co.	55	U. S. Air Compressor Co.	—
Green Engineering Co.	58	Universal Mfg. & Sales Co.	56
Greenfield Tap & Die Corp.	31		
Greer College of Motoring	58	V	
		Van Trump-Eselsby Co.	29
H		Victory Oil Stove Co.	—
Harvey Spring & Forging Co.	50		
Hauck Mfg. Co.	55	W	
Heiser Special Tool Co.	—	Wagner Specialty Co.	59
Hicken Sod-Tor-Lite Co., B. E.	59	Warshawsky & Co.	58
Hobart Bros. Co.	—	Washburn Burner Corp.	—
		Webber & Co., P. H.	47
J		Western Rubber Mold Co.	61
Jenkins Vulcan Spring Co.	56	Wiggins Co., The John B.	52
		Worcester Abrasive Co.	48
Z			
		Zinke Co.	52 and 56

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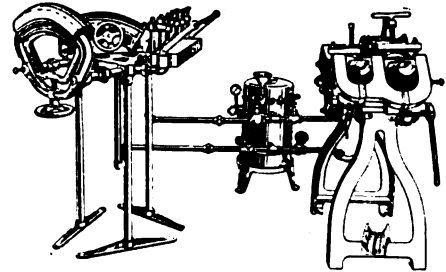
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quickly release
the tire.



A marvelous Super Vulcanizer ten years ahead of anything else. It can be adjusted in the "twinkling of an eye" to fit cords, fabrics, regular or oversize tires. It will save time, money, space and labor—Make you satisfied customers and contented workmen—Easy to operate—Prevents "buckles", "honey comb" cures—"marked" sections.

Don't Junk Your Old Equipment

We have an outlet for it with persons just starting up who can't afford an elaborate outlay, but who will later trade in as we are offering to take yours in trade. Are you interested? Write immediately for details on this new mold and our remarkable TRADE IN Offer.

Western Rubber Mold Co.

251 N. Crawford Ave., Chicago, Illinois



Copyright 1921, by A. Schrader's Son, Inc.

**Don't let your Tires
go this way**

They will unless you keep the proper amount
of air in them.

Correct air pressure in your tires means: MORE MILEAGE,
EASIER STEERING, INCREASED SAFETY.

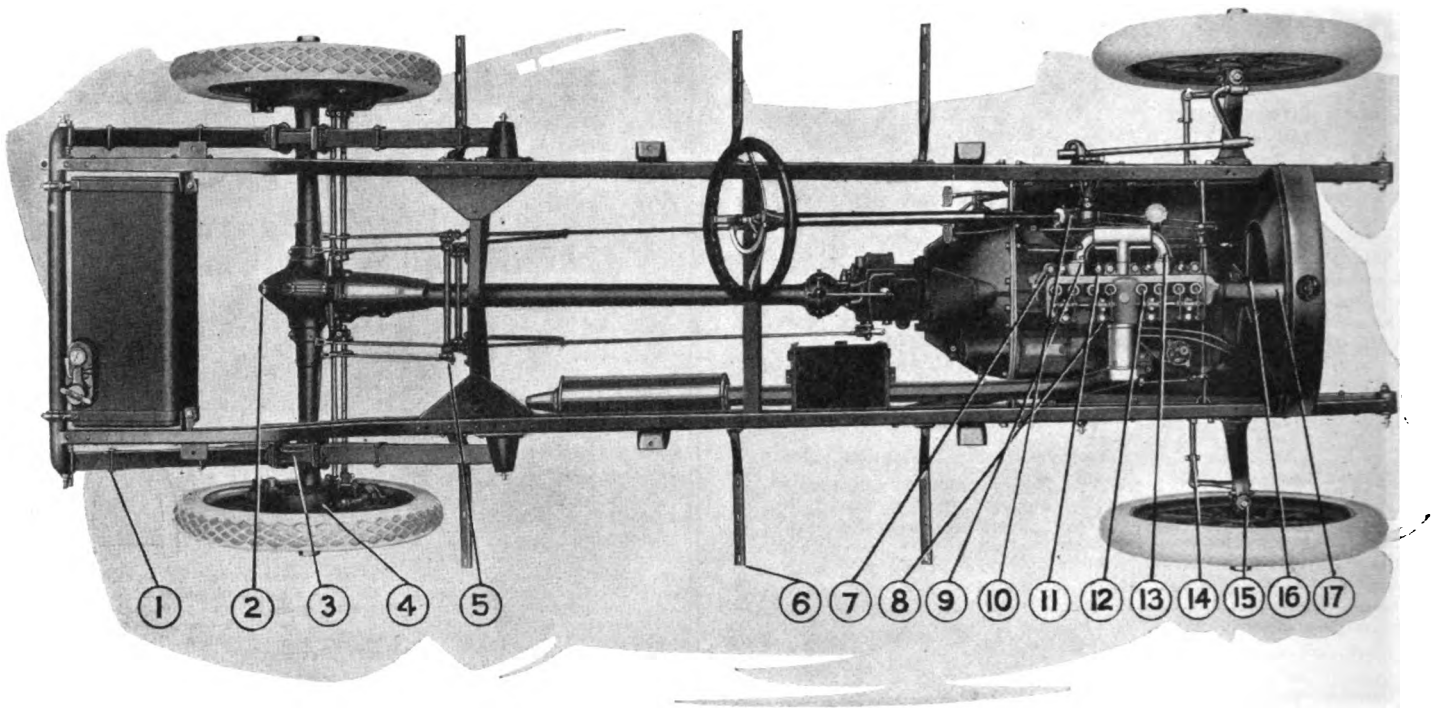
THE SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

will always tell you when your tires have the air pressure
prescribed by the Tire Maker.

Price \$1.50 in the U. S. A.

A. SCHRADER'S SON, Inc.
BROOKLYN, N. Y.

This ad should convey two messages to all dealers: Keep your stock right to
supply the demand. Keep the air pressure in your tires right.



Here are 17 of Over 1000 Uses for RUSTSOLVO

- | | | | |
|---------------------------------------|------------------------------------|----------------------|----------------------|
| 1. Shackle Bolts | 5. Brake Rods and Pins | 9. Intake Manifold | 14. Radius Rods |
| 2. Differential Housing Bolts. | 6. Body and Fender Bolts | 10. Steering Knuckle | 15. Spindle Bolts |
| 3. Spring Clip Bolts and Nuts. | 7. Cylinder Head Bolts | 11. Spark Plugs | 16. Fan Shroud Bolts |
| 4. Brake Bands Adjusting Bolt and Nut | 8. Exhaust Manifold Bolts and Nuts | 12. Valve Cages | 17. Radiator Hose |
| | | 13. Pet Cocks | |

PRINT name and address with
SHARP PENCIL to insure
prompt delivery

The Rust Products Co.,
64 E. Lake St.,
Dept. C-3, Chicago

I wish to take advantage of
your special introductory offer
on RUSTSOLVO. Please send
me a full pint can by prepaid
parcel post.

Mark out one line

I enclose P. O. Money Order
for \$1.00.
Send the package C.O.D., \$1.00
Also send free booklet on
RUSTSOLVO USES.

NAME

STREET

TOWN

STATE

RUSTSOLVO—A Big Time Saver for All Who Make Repairs on Autos, Trucks or Tractors

How many times have you broken important parts by jerking at a rust bound nut with a big wrench that gets the nut loose, but takes the thread of the bolt with it?

Give a few drops of RUSTSOLVO a chance to work down into the rusted threads, and you can back the nut off easily, and free the bolt without injury to the Bolt, Nut or Part.

RUSTSOLVO is a **noninflammable**, free flowing liquid. It cuts rust, red or white lead, carbon, shellac, paint, tar, dried or heat-hardened grease, or green corrosion on batteries. Does not injure the hands, metal, rubber, wood, or cloth. You will find it one of the best paying tools in your garage. Sells readily to customers.

GUARANTEED. Every can of RUSTSOLVO is guaranteed to give satisfaction. See for yourself how much money it saves. Your money back if you are not thoroughly pleased.

In order to introduce RUSTSOLVO to garages and accessory dealers, we will send a full pint can with handy oiler top, prepaid, to any address in the U. S. for \$1.00. Send today for Booklet C-3 and dealer's discount.

RUST PRODUCTS CO. of America, 64 E. Lake St., CHICAGO

RUSTSOLVO

THE PRODUCT WITH OVER A THOUSAND USES

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers



Trim it to Shape

You save time and money by using FIT-ALL, "The shim that can be cut to fit." FIT-ALL is a Laminated Shim. Simply clip it to the right shape with the tinner's shears—peel off the thin layers of brass to the required thickness—all done.

FIT-ALL

Holes already punched: $13/32$ " for $3/8$ " bolts, $17/32$ " for $1/2$ " and $7/16$ " bolts. Laminations, .003"; thicknesses, $1/32$ " and $1/64$ ". In packages of 25 shims.

Address "Sample Manager"

LAMINATED SHIM CO., Inc.

47 West 34th Street, New York

Detroit
St. Louis
Chicago

Dime Bank Building
Mazura Mfg. Co.
1118 S. Michigan Ave.

LAMINUM



March 7, 1921.

M. W. Dunton Co.,
Providence, R. I.

Gentlemen:

In the fall of 1917 I bought a two oz. can of NOKORODE and have just today emptied the can, altho I gave over 30% to another fellow who was using acid (hcl). I have done over two hundred and fifty jobs with this one can, from simply soldering two wires to "fixing" wash boilers and many other jobs. The paste has been frozen, melted, and almost under every condition that would make any other paste refuse to work. The best thing I like about it is that so very, very little is needed even tho it is three years old.

If you can use this letter to any advantage you may, for I will back NOKORODE to the end.

Sincerely yours,
John E. Gorrell.

Convincing Proof of the Economy of NOKORODE

"hcl," a symbol for Hydrochloric Acid—stands for High Cost of Living to the man who solders.

See the testimonial letter of John E. Gorrell!

This 2 ounces of Nokorode Paste that sold for 15c lasted three years, making an average cost of 5c per year to do 80 jobs.

WE HAVE ALWAYS CLAIMED THAT NOKORODE WAS THE CHEAPEST FLUX IN THE WORLD.

This is only one proof of many that it is the cheapest!

Why not put it to the "economy-test" yourself?

SAMPLE AND PRICES ON REQUEST.



Reg. U. . Pat. Off.

THE M. W. DUNTON CO.
Providence Rhode Island, U. S. A.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

MAY, 1921

Vol. 12—No. 5.
10 Cents the Copy
\$1.00 Per Year.

A Friend in Need

*Easier Than Sticking on a
Temporary Cold Patch*

Quicker Than Changing Tubes

The Shaler 5-Minute Vulcanizer makes permanent, heat vulcanized repairs that will not come off,—stronger than the tube itself. No cement—no gasoline—no flame. Simple, sure, safe, satisfactory. Over a million motorists carry this convenient "Friend in Need" in their cars to protect themselves against the annoyance and delays of puncture troubles.

**Complete \$1⁵⁰
Outfit**

At All Auto Supply Stores

The outfit includes the vulcanizer—12 Patch-&-Heat Units (6 round for punctures, and 6 oblong for cuts) price complete \$1.50. (Slightly higher west of the Rockies and in Canada. (Extra Patch-&-Heat Units 75c a dozen.

C. A. Shaler Co.
354 Fourth St., Waupun, Wis.





When valves are on the bum, the fact is advertised by the knocking and banging of the motor.

AND



Perfectly faced valves mean a smooth running motor and no loss of compression.



**Non-Freezing
GRINDING**

**Non-Drying
COMPOUND**

Really perfect valve grinding was unknown before the coming of "PEP". When oil-mixed compounds were used, the coarser particles of the abrasive, traveling in ruts, left tell-tale rings and grooves on the valve face and seat, even after the finishing grade was applied. Water-mixed "PEP" renders oil mixed abrasives obsolete. Water, being thinner than oil, distributes the abrasive so evenly that a perfect finish is produced.

"PEP" does its work in one operation with one grade of abrasive—in half the time required by oil-mixed compounds. Only a water-dampened cloth is required to wipe the valves after using "PEP". No cracked hands from using gasoline or kerosene.

"PEP" doubles the profits on every valve grinding job. Test it at our expense using the coupon below.

WORCESTER ABRASIVE CO.

1662-1664 Broadway, New York City

Refer to list of jobbers handling "PEP" shown in our advertisement in Automobile Trade Directory—"The Red Book"

FREE

**WITH YOUR JOBBER'S O. K.
ON THIS COUPON WE WILL
SEND YOU A SAMPLE CAN OF
PEP FREE**

FREE

Your jobber wants to sell you the BEST Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a can under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a can of PEP for testing purposes. I will let you know the results of this test.

JOBBER'S O. K.

Please send the party whose name is written above a trial can of "PEP".



WORCESTER ABRASIVE CO.

1662-1664 Broadway

New York



MARCO PISTONS

FINISHED - SEMI- FINISHED - CASTINGS

Made to Serve and Satisfy the User

Selling products that do not last kills future sales by raising the up-keep cost of your customer's car or truck and creating dissatisfaction.

Jobbers' and dealers' stocks as a source of supply are measured only by the service the products give. Selling cheap goods—or buying them—not only makes quicker re-purchase necessary, but instills dissatisfaction that finally results in the loss of the buyer's trade.

MARCO Pistons build permanent trade. They are wear resisting. Quality grey iron multiplies their life and permits them to act as a co-operating unit in the maximum efficiency of the engine.



Dipped in Oil

Finished pistons are dipped in oil, to prevent rust, and then wrapped, individually, first in wax paper and then in heavy Manila paper. Order finished pistons in full sets to insure balanced motor.

616
So. Mich. Ave.



Chicago
Illinois

Write for Marco Discounts

Jobbers and dealers whose first policy is to build permanent trade—and who realize the waste effort of pushing ordinary merchandise—are urged to write for the MARCO Piston catalog, giving liberal discounts.

Pushing the sale of MARCO Pistons results in a longer profit per sale; yet they mean less piston expense to the car owner in the end.

Weak points are eliminated in MARCO pistons. They are reinforced beneath the head and strengthened around the boss. Rigidly built with added sturdiness. Finished in the rough, semi-finished or finished to standard oversizes .003, .020, .031, .046, .062. Prompt deliveries. We have pistons for 2,500 models of internal combustion engines.

MINNEAPOLIS

MARVEL MACHINERY COMPANY

Write for catalog and prices, Dept. of Piston Sales

MINNESOTA

Marvel

Cylinder Reboring Machine

**Power Driven
Automatic
Easy to Operate**

Used in a Thousand Repair Shops. Rebores any Gas Engine Cylinder from Motor Cycles to Tractors.

**Does Work at Lower Cost
—in Less Time—Better.
Write for catalog**

"It's a Marvel"

**Write
Direct to the
Manufacturer**

Marvel Machinery Co.
510 Loan & Trust Bldg., Minneapolis, Minn.

Read This

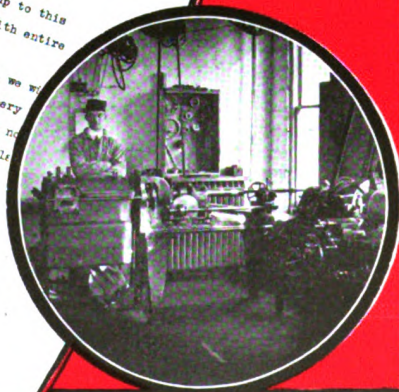
H & H MACHINE COMPANY
CONTRACT MACHINE WORK OF ALL KINDS
AUTOMOBILE PARTS AND ACCESSORIES
4200 EASTON AVENUE (WEST BLUCK)
ST. LOUIS, MO.
March 17, 1921.

Marvel Machinery Co.,
1301-1307 S. Third St.,
Minneapolis, Minn.
Gentlemen:-

Replying to your inquiry as to the service we have been getting from your No. 5 "Marvel Boring machine, we are pleased to state we have up to this time bored a great many automobile cylinders with entire satisfaction to us, as well as the customer. As to the capacity of the machine, we may say, that we have lately bored a "Hamilton Stationary nine-8" bore with a 24" stroke, and we therefore do not hesitate to recommend this machine for all that is old of it.

Very truly yours,
H. & H. MACHINE COMPANY.
Chas. H. H. Machine
Vice-Pres.

**"It's
a
Marvel"**





The HURY-KANE SPARK PLUG CLEANER

sweetens repair profits

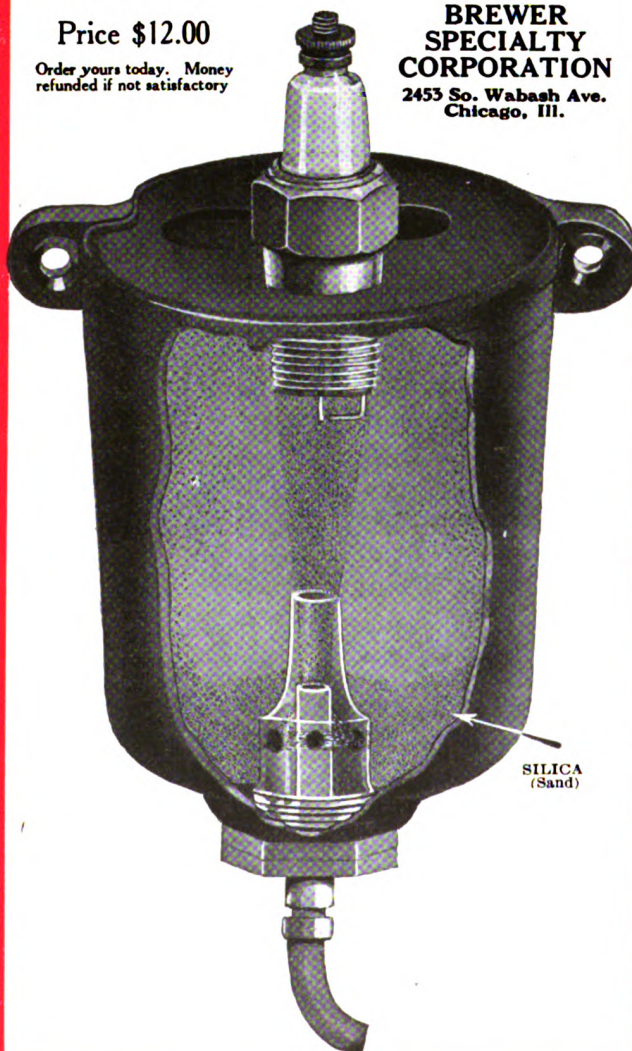
through the saving of labor costs. The repair job is not complete unless plugs are cleaned. If cleaned properly—the old way—it takes time. "HURY-KANE" does the job thoroughly at a nominal cost. Your competitor will have a "HURY-KANE." Can you afford to be without it?

Your compressed air does the work. Operates on the sand blast principle. 45 lbs. or over air pressure shoots sand (grit) into plug with sufficient force to clean thoroughly in less than five seconds. Lever or tire filling valve is used.

Price \$12.00

Order yours today. Money
refunded if not satisfactory

**BREWER
SPECIALTY
CORPORATION**
2453 So. Wabash Ave.
Chicago, Ill.



American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Business? It's Improving.....	9
Make the Dollar Work!.....	9
Basic Thing in Business.....	10
What Is "Cost"?.....	10

GENERAL

Service at a Dollar Per Car Per Month, by Felix Koch	11-12-13
How Advertising Aided Garageman, by George C. Mason	14-15
The Other Feller's Always Got the Snap, by Frank Farrington	18-19
A Malingering or a Neurasthenic?, by Chesla C. Sherlock	21
Glimpses in the Garageman's World.....	27-28
Vulcanizing an Art Worth Learning, by J. N. Bagley	22-23-24
Penlings from the Pen of Dike.....	34

DEPARTMENTS

Accounting, by J. N. Boddy.....	16-17
Welding, Cutting and Brazing Practice, by David Baxter	25-26
Practical Hints for Shop Mechanics.....	29-30
Readers' Questions and Answers.....	31-32
Accessories—Dealers' Key to Profits.....	36-38-40
Up-to-the-Minute Garage Equipment.....	42-44-46-48
Here and There in the Motor World.....	50

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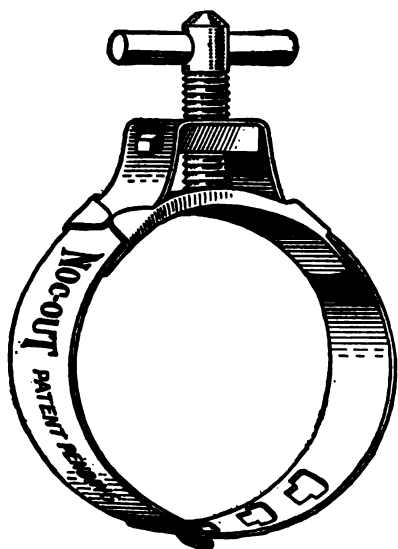
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Rates on Request.

The Latest Invention in Design and Construction of HOSE CLAMPS



The "Noc-Out" Hose Clamp is a money-saving article. It is a one-piece clamp, made to fit two or three sizes and any thickness of hose connection; can be applied without a tool and the construction is such that it does not cut or buckle the hose.

It is made in eight sizes, ranging from $\frac{1}{2}$ " to $3\frac{1}{4}$ ", inclusive.

Garagemen find it profitable to use this clamp in their repair department; also to carry a supply for resale purposes. A display board furnished without cost.

AUTOMOBILE REPLACEMENT COILS FOR ALL STANDARD BATTERY SYSTEMS

Our Replacement Coils are designed to interchange with all standard battery ignition systems. Brackets, terminals and connections make them readily adaptable to all cars.

Every cell is thoroughly tested under high pressure. They are made of the best material possible to obtain and assembled by experienced and careful workmen. Guaranteed one year. Write for specifications and prices, also our special proposition. It will save money for you.

R. T. MFG. & SALES CO.

Factory:
Green Bay,
Wis.

Sales Dept.:
3847 W. Madison,
Chicago, Ill.

No More Leaky Tops



STAY-ON AUTO TOP PATCHES

are rendering a valuable and highly appreciated service to thousands of car owners. In numerous instances they have saved the necessity of buying a new top.

For repairing tears and holes, there is nothing like Stay-On Auto Top Patches. They adhere so firmly and permanently that they make the top as good as new.

These patches are equally effective in repairing curtains and upholstery. Stay-On Auto Top Patches come in sheets $3\frac{1}{2} \times 12$ inches—each sufficient to cut a number of patches of any size or shape. They are packed in display carton containing 4 Pantasote Leather, 4 Mohair and 4 Pebble Grain for Ford Tops.

DEALERS—Your customers will readily appreciate Stay-On Auto Top Patches and other "Beats-All" products as well. If you are not acquainted with this line, ask your jobber or write us for descriptive catalog.

Auto Specialties Mfg. Co.
40 Elm St. Buffalo, N. Y.

"Beats-All"
Auto Economy
Products



Champion Equipment gives the biggest measure of satisfaction for the money

To that end we have developed CHAMPION Air Compressors to their present position of pre-dominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

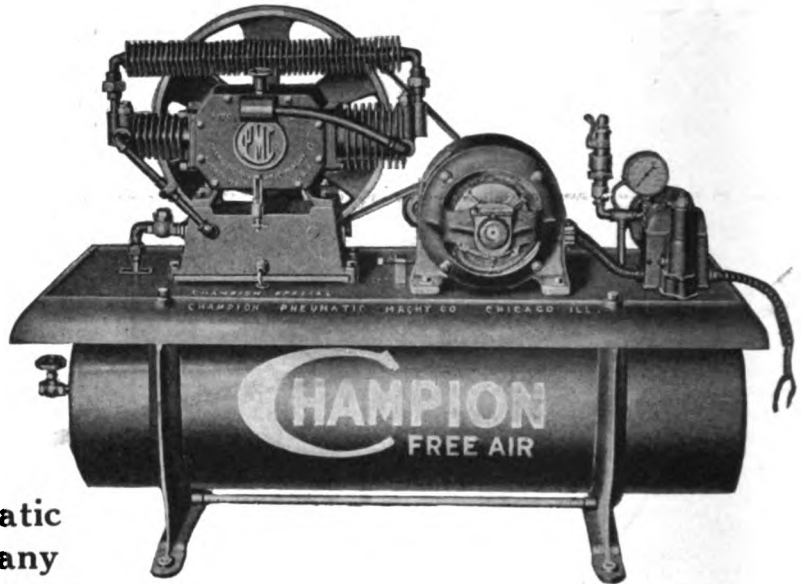
An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

Champion Pneumatic Machinery Company

1403 So. Michigan Ave

Chicago, Illinois





Tell Your Story in Oplex Letters of Light

MOST of the best known trade names—cars, tires, accessories—have been reproduced in the *raised* snow-white glass characters of an Oplex Electric Sign. Probably we have moulds for the trade name of the line you handle. If so, we can save you money on the cost of your sign.

Oplex Signs are the kind with the *raised* snow-white glass letters, perfect day signs as well as night signs, greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing an Oplex Sign to suit your business

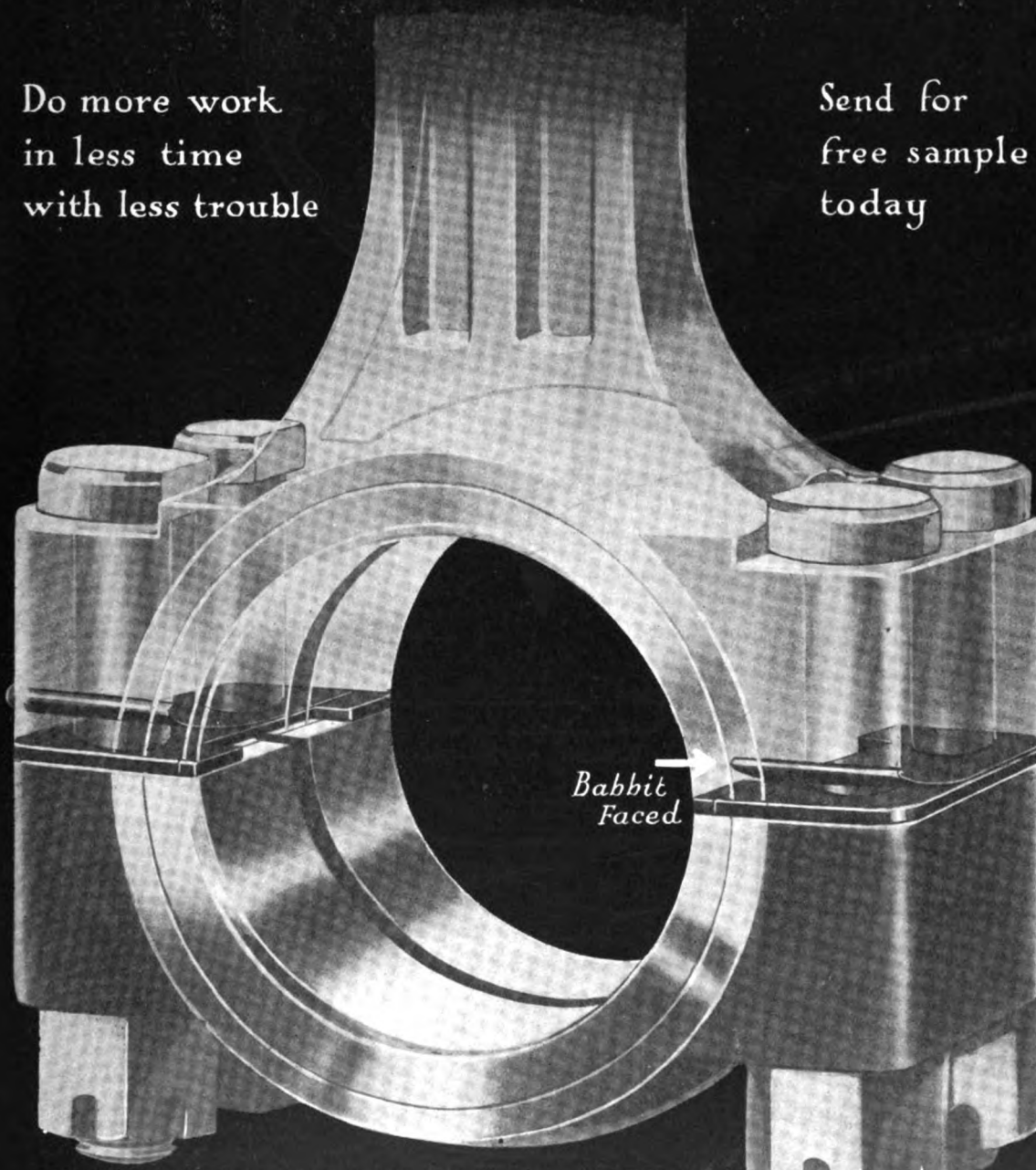
FLEXLUME SIGN COMPANY

25 Kail Street
Buffalo, N. Y.

SHIMS OF *LAMINUM*

Do more work
in less time
with less trouble

Send for
free sample
today



LAMINATED SHIM COMPANY, Inc. 47 West 34th Street New York

DETROIT—Dime Bank Building ST. LOUIS—Mazura Mfg. Co. CHICAGO—1118 S. Michigan Avenue

SPEE-DEE

**Cleans
everything**



**Injures
nothing**

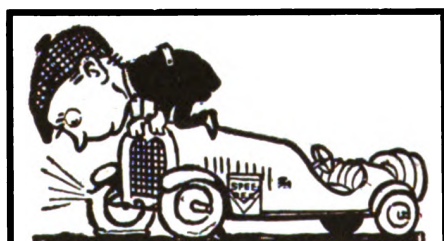
Nothing Like It for the Hands of Motorists and Mechanics

That's why SPEE-DEE sells so consistently. Every man who drives a car has to stop once in a while to make some repair or adjustment that leaves his hands soiled and greasy. Cold water won't clean them—gasoline means chapped or cracked hands. But such a situation is no dilemma to the man with a can of SPEE-DEE. He can effectually clean his greasy, grimy hands *with or without water* and without injury to the skin. No wonder the motorist who uses SPEE-DEE once will not drive without it.

In your shop, SPEE-DEE will quickly prove its worth and your men will prefer it to anything else for cleaning their hands after dirty work.

Every car owner will buy SPEE-DEE when you show him what it will do. Repeat sales are "certain sure" because the man who buys one can will find it useful for so many purposes that he will be back—again and again—for more.

Write today for full details and dealer selling helps.



For Dirty Hands in Dry Territory

You don't need water. SPEE-DEE cleans without it. Makes the hands clean and smooth or removes all spots from the clothing. No lye, grit or acid to irritate the skin. Cleans everything without harm to finish or fabric.

States Chemical Company

680 W. Austin Avenue
Chicago - Illinois



Good - Bye, Dirt!

The dirt and grease fly when you use SPEE-DEE either with or without water. Makes the side curtains or seat covers look like new without injuring the fabric. Cleans walls or woodwork. A creamy cleanser that contains no lye, acid or grit to irritate the skin.

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 5.

CHICAGO

May, 1921

Business? It's Improving.

Early this year, the slogan, "1921 will reward the fighters," was prominently featured throughout the country. And many there were who resolved to be among those participating in the rewards.

The fight is now at its most interesting stage—so is the baseball season. How often a man reaches third base, and then never scores that run. Don't "die on third," for the run is not scored until the home plate is crossed. The pessimist is the one who "dies on third," while the optimist scores the winning run.

The optimist is not concerned with present conditions so much as he is with the outlook for the future. He looks over the banking statistics and finds many signs indicative of stability and better business.

The reserve ratio of the Federal Reserve system is nearly 56 per cent as compared with about 43 per cent a year ago. This improvement has been partly due to the increase of gold and the rapid decline in note circulation and deposits. It indicates that borrowers have been paying their debts.

The governors of the Federal Reserve bank have shown their belief in easier money conditions by reducing early this month the discount rates from 7 per cent to 6½ per cent at several of the banks. Easier money conditions optimists interpret as a certain cause of ultimate business revival.

Only the other day, Secretary of Commerce Herbert Hoover expressed

his belief that the worst has passed and at recent annual meetings of several automobile manufacturing corporations this same belief was expressed.

Since the first of this month, several manufacturers have announced reductions in prices of cars and tire manufacturers have made cuts in tire prices. These are elements which help to complete the readjustment that began in

A SUMMING UP.

We have much upon which to congratulate ourselves. Our difficulties are infinitely less than those of Europe; we have weathered the danger point of a great crisis; our financial system has proved its strength and for the first time we have passed safely through a commodity crisis without monetary panic. Our people have abundant food and abundant clothing. We are at least warmly housed, even though crowded.

We possess in the high intelligence, high courage, and high ideals for our people, ample reserves of economic, social, and political strength. We possess a great sense of neighborliness that has had fine manifestation in these difficult months in help given each other for weathering the storm. We have had a remarkably small ratio of failures.—Herbert Hoover.

the automotive industry about a year ago, and the end of the readjustment should not be far away.

With gasoline prices considerably lower than a year ago and the credit situation easier, there is absolutely no reason why everyone in the automotive industry should not be optimistic.

Reports from the manufacturers indicate production is increasing, and the opinion generally is that conditions

are gradually becoming better. It is stated that the improvement has been so gradual and consistent that it presages a continued increase of business along conservative lines. The belief is prevalent that the condition of extreme depression has certainly changed for the better.

Make the Dollar Work.

No matter how many dollars are put into a business, unless they are made to produce new profits they might better be left in the bank, or loaned on good security to some one who would pay the legal rate of interest. Idle dollars represent a continual loss, especially when they are tied up in stock that no one wants.

This fact, of course, is quite generally understood—but the difficulty lies in the fact that the dealer is not always able to tell when the dollar is idle and how to make it stick on the job, for the dollar is a quiet worker. Unless he has the right kind of assistance, the dealer may not discover until it is too late that some portion of his capital has gone into retirement.

There is only one sure way out of this, and that is through figure records that tell everything that is done about the store during the day, how much stock is on hand, how much is tied up in accounts receivable, sales for the day, payments on account, expenses—in fact, every little detail that affects the profits the dollar should make.

We are told by commercial agencies that at least 90 per cent of dealers overbuy because they do not know

how their stock is moving. They lack the records that should tell them when it is necessary to buy certain lines and when it is not. And right here it is well to say that a large proportion of failures are due to this glaring business fault.

Whenever a dealer invests his money in a certain line and sells out that line entirely, he has turned his investment once. Every time a turn is made, a profit is made. It follows then that the more turnovers a dealer can pluck from his dollars, the greater will the number of his profits be. Frequent turnovers, then, can not be accomplished if a dealer is inclined to over-buy.

Consequently, it doesn't take much of an effort to show that a few dollars turned frequently will do more than many dollars that move slowly or dollars that do not move at all.

The number of times a year the stock of a business is turning may easily be figured by dividing the year's sales—figured at the cost of the goods—by the average value of the stock on hand during the year.

The cost value of goods sold last year in a certain store amounted to \$50,000. The stock records showed that an average of \$10,000 worth of goods was carried. Of course, there was more than this amount on hand sometimes, and less at others, but the *average* for the year—the only safe basis for figuring turnovers—was \$10,000. This goes into \$50,000 five times—that is, this business succeeded in making five complete turnovers.

There is another way of figuring turnovers that, in many cases, is equally satisfactory. It is to take the total sales, at the selling price, and divide by the retail value of the stock.

A very natural mistake can be made—has been made in some cases—where a dealer takes his total sales at retail and his stock at cost and attempts to find the number of times his capital has turned. See what happens: Sales (at retail) \$75,000; stock (at cost) \$10,000—turnover $7\frac{1}{2}$.

This is an easy way to make a few

more stock turns, but it isn't worth much as an accurate reflection of the condition of the business. And figures like these must be accurate if they are worth anything at all.

Another thing to be remembered is that actual inventory figures do not always show the average condition of stock. The wise manager lets his supply of goods get as close to the low-water mark as he dares before taking inventory, so as to cut down the labor required. Where a stock record is kept, an average of value of goods on

The man who is too stingy to spend money for lubricating oil for his automobile, and too shiftless to keep water in his radiator, must not grumble if he has a machine so overheated that the parts become welded together and will not go. "There is an economy that tendeth to poverty." The man who would reap must plant; the man who would profit must spend.

hand can be taken, which is more satisfactory for figuring turnovers than the inventory figures.

Basic Thing in Business.

"We've got to be bigger men than we ever have been if we are to live up to the new idea in business." Thus declared the general manager of one of the large motor car corporations. And in his opinion "the basic thing in business" is the establishment of confidence.

This man, of many years' experience in business and in dealing with the public as a salesman, declared that the only difference in men is the degree in which they have established themselves in their community. No thing can be marketed in which the public has no confidence. Neither can a man in whom people have no confidence market his services. The measure of our success in dealing with problems is the measure of the man in us.

The motives which actuate a man in business underlie the confidence which he can establish. In the case of the

manufacturer, it is the kind of an article—whether the motive is to get rid of the product or to have honorable dealings with the public.

Then there is the attitude of the men who build the product toward the concern. When employees say "I am going to buy this one because I know the stuff that goes into it," there is no question as to the success of that particular product.

Speaking directly of the automobile industry, this manufacturer declared that the manufacturers will come to regard the dealer as the backbone of their business. They are beginning to realize that every man is a part of his own industry and not only a part of his own concern. And this will all come about through a realization that the basic thing in business is confidence.

What Is "Cost"?

"It's the little foxes that destroy the vine," is a saying that those who have experienced reverses in business often wish they had had brought to their attention. These little foxes that destroy the vine in business may be found in the way of unnecessary costs.

Just recently an expert on costs took to task the head of a large business college declaring that the methods taught in the modern business school are based upon wrong principles. The reply was "We know we are teaching wrong methods but we do it because the business men are using wrong methods."

The expert asserted that only a small percentage of men know the correct principles of cost accounting. When he was asked for his definition of "costs", he replied:

"Cost is the sum of expenses involved in the production and distribution of an article up to the time its cost is determined."

Under this definition, the longer any particular item is held, the higher is its cost; hence, the faster stock is turned over, the less the cost and the greater the profits. A study of cost accounting is decidedly worth while.

Service at a Dollar per Car per Month

Unique and Successful Venture Introduced as a Business Builder by Cincinnati Garage—Repair Work Calls Assigned in Rotation So Everyone Is Satisfied—Record Kept of Repair Needs of Each Customer and His Preferences

By Felix J. Koch

On the face of it, viewed from the standpoint of the garage manager possessed of just the slightest degree of business acumen, it seems preposterous.

"One Dollar Per Car Per Month" read the advertisements appearing in the local dailies, on cards tucked under the doors of private garages, on the billboards at important crossroads,—the letters done in colors such as would catch the eye at once.

Just below,—briefly, succinctly put, that he who rides his car may read—are detailed:

"Entitles You to Road Service Without Any Additional Charge Within Radius Of Twenty Miles Of Service Station.

Road Service Means:

- I. Changing tires.
- II. Delivery of gasoline at prevailing market prices.
- III. Starting car, ignition, carburetor troubles.
- IV. Towing car to any point of designation in the service zone, if same is wrecked or will not run for other cause.

V. Inspection at our service station whenever desired.

VI. Discount on tires and tubes to members."

All these things for a dollar a month—a dozen dollars a year!

Small wonder, indeed, that not only Cincinnatians, but motorists in innumerable towns and villages on the farthest bounds of the territory designated are becoming subscribers to the Heuck Auto Service, as it is known in Cincinnati, where the central station is located, and that business is growing by leaps and by bounds.

Meanwhile subscribers and half-envious rivals are raising the question: "How can the Heuck interests do it?"

How—that is to say, in these days of high price of labor—can a public garage, located on a highway coming through exclusive residential suburbs, yielding no end of repair work, from a network of outlying farmsteads and villages to the business heart of a big

American city, maintain so extended a service at this price?

Believing that, in the answer, there might be a profitable object lesson for garage owners elsewhere, we put the question squarely to T. R. Tryling—"Bill" Tryling—he is known in automobile circles—originator of the service and in charge of the Heuck Garage.

"It is, in a way, a case of diamond



Changing Tires on the Road—A Task One Gladly Escapes.

cut diamond," he put it. "We happen to have built up a very nice little repair business and we keep ten men on the daytime payroll to look after this. These men, let me emphasize, are on the payroll the year 'round, so that when customers bring cars for repair or overhauling we have the experts to make the repairs.

"The repair business is, unfortunately, largely a game of waiting. One never knows what the next hour may or may not bring. Ten o'clock in the morning may find all hands idle 'swapping stories' in the men's room. Half-past ten may find us seeking extra help, if findable, to take care of the influx of cars.

"Through those lull hours, those men are drawing wages. Everyone has told everyone else all he knows. It is actually monotonous sitting about awaiting work at the shop. The

men would much prefer to render value received for their pay. They are really delighted when a call comes to take a car and dash off to perform some outside service, make some repair.

"The larger our in-garage repair trade, the more such calls for help from the clients when in trouble outside. And," he smiled broadly, as though giving away the very heart of the secret, "the more calls to help outside, the more work eventually here!

"The calls are assigned the men in rotation. A takes the first call, say, be it wheresoever and for whatsoever purpose, B takes the next, C the next, and so on. Thus we play no favorites and everyone is satisfied. As soon as a man has finished the work required on the given service, he goes to the nearest telephone, calls us up, and if there be any other call 'in' from that locality just then, he proceeds to it. Wages, recollect, are going on just the same. It doesn't matter in the least to that man whether he travels thus from one to another of half a dozen calls or returns at once for other work in the shop.

"In shop, in turn, these men are assigned repair work only, but this, too is made interesting by its variety as we repair all kinds of cars.

"With the labor problem attended to in this way, and another shift of men on duty here at night to attend such calls as may come then, we had little trouble evolving a service list which we believed would bring us clients and would pay in the end, if only as another business winner."

"But some of the things you promise to do seem so slight, when compared to the distance your men may have to travel, the gasoline they will use on the going and return trips, in order to keep your pledge?" we protested.

"Take just the first, changing tires, for example."

Mr. Tryling looked sagely toward the tire-room of the big garage, where shelf on shelf hung heavy with tires and tubes of every description and size and make.

"When you subscribe to our

service," he said, "we take a careful inventory of your car—bumper-bar to tail-light, end to end. We make a record of the things you use of every sort—sizes, grades, preferences you may have as between these; in brief, all facts pertinent to new supplies or repairs.

"Should you or yours ring us up and state that you are tied up by a bad tire two miles south of Glendale, that you wished us to come immediately and change tires, as pledged, we would not waste your time with questions. We would know, from our books, what your front wheel or rear wheel requires for size; your preferences in tires; and so on. Either we would start a car to the rescue with such tires aboard, or, just as soon as any of our repairmen out on call with such tires along with them 'rang in' from some point convenient, we would dispatch them to your aid.

"And our end of it?

"Well, consider: A 'blow-out' on a country road almost always means a new tire. The victim may carry a 'spare' tire on his machine and have our man put this in place, but he will then be minus a spare. Possibly the original tire can be repaired. What more natural than that he should bid our man take this aboard, and that we, and not some other firm, get that bill? Possibly the tire is obviously beyond repair. Probably he needs a new tube, if not casing. Human nature is human nature. You can count upon gratitude. If we send a man 15 miles to change your tire, you will hardly reward us by going somewhere else to buy your new tire. Particularly," and he smiled again, "not when you know that we are pretty certain to see that new tire on your car the next time you use our service.

"In fact," he summarized, while a repair car dashed streetward in response to a summons, "changing tires for our patrons is one of the features of the service which pays us best.

"The average call for this purpose will be somewhere within ten miles of the garage.

"In response to it, we dispatch a small roadster, equipped with an air tank for inflating tires, a full equipment of tools, automatic jacks, and other things for which there may be a call although not suspected by the luckless motorist, extra batteries and the like.

"We keep three of these cars ready for instant service, and we keep them

loaded with almost everything experience shows may possibly be required. From Westwood to Norwood, to the Ohio and across it into Kentucky, a man darts with his car as the occasion requires.

"Should each of 300 subscribers to the service put in one call in rotation in any given period, we estimate that a hundred of the calls would have to do with changing tires.

"Incidentally," he added, "changing tires is often dusty, muddy, hot and dirty work, but we do not permit our men to accept tips! To begin this, we believe, would soon ruin the business—and instant discharge awaits any man in our pay proved to have accepted a tip for any work.

"Delivering gasoline at regular market prices—five gallons for \$1.40



No Need to Trust to Luck for Gasolene.

just now—also does not fail to bring us revenue.

"Remember, that very often the man bringing gasolene to the car requiring it is doing so on a detour home from some other call. Remember, that all calls for gasolene are not urgent; that often clients wish the gasolene delivered to the home garage and tell us that, within reason, we may take our time. Remember, that many of these deliveries are within short distance of headquarters; that it is a simple matter to arrange a route and make many calls on just a single trip.

"We find, as a rule, people telephoning in for gasolene will want a minimum of five gallons, and so we provide our automobiles with five-gallon tanks. As desired by the buyer, the chauffeur empties the gasolene into the car or garage tank; then brings the empty container home.

"It will often happen that patrons, telephoning thus for fuel, suggest that 'when the man comes, he might bring' this, that or the other accessory desired or required at this time; and that sale, too, helps swell the profits the service manages to bring in.

"Still again, with summons for gasolene from patrons stalled on the highways or byways of city or country, it often happens that when the attendant reaches the scene, he finds the real cause of the car's stopping is not a want of gasolene at all. Faulty ignition or trouble with the electrical mechanism of the automobile, are more apt to be the reasons.

"These things the mechanic stands prepared to right then and there, making the repairs while the car-owner watches, and putting the car back into service. Just watching the work, as the waiting man must, is apt to excite admiration for the mechanic's superior skill. To that man or his house alone, from that time on, will this owner entrust his repairs.

"When a man calls up from perhaps as far away as Hamilton, asking that you bring gasolene out to 'start him,' and your expert, arriving, shows him that he has abundant fuel, but that his platinum points need repair, he feels a bit sheepish, watches—and also marvels—and resolves that hereafter you will look his car over oftener and be told to go ahead with any needed repairs.

"When it comes to considering the task of starting cars for clients, it must be recalled that almost all subscribers are amateur motorists. A, B, C and D, may know their own professions thoroughly and be motor-lovers from the standpoint of touring, but be quite ready and willing to leave it to others to attend to the mechanics of the car.

"So there come times innumerable when such owners can not start 'Lizzie.' Sometimes a man has overlooked turning the switch—an instant's touch from the repairman gets things going. Sometimes batteries are run down. Sometimes, if the weather turns cold, priming is not what it should be. Winter weather brings us by far the most calls.

"Whatever the cause, it's a grateful patron you make on the road.

"Then there are wrecks. To promise to tow in a car from any point in a given area for a dollar does seem to be a ridiculously small charge. But consider: First of all, real wrecks, requiring towing in, come but seldom. Nine times out of ten, our repairmen, summoned to get a given car for towing, find they can get it into condition to run on its own power then and there.

"Wrecks are usually the results of reckless driving, by the car-owner or by someone else rushing into him. In

either case, parties responsible are eager to conceal the damage done as soon as possible. The very first words of greeting to our men are apt to be directions to 'get it to the shop and put it as nearly as possible in condition just as soon as may be possible.' That means a good-sized repair bill, of course.

"Wrecks, in fact, pay so well that we have arranged to go as far as 60 miles in any direction to attend to a wreck and tow the car home. For every mile beyond the 20 included in our service area, subscribers to our service are charged just 50 cents for bringing home the car.

"For this work we maintain a swift wrecker car, equipped with complete automobile wrecking outfits, even to cranes that will lift up to ten tons. Three men are put aboard the car when the wreck seems to promise to be of any size. Should passengers be injured, or it be impracticable to get them home by train or interurban or other media, our men telephone the fact to the office and we send another car out, free of cost, to bring them in.

"You see," he said, leading the way back into the big garage, where car upon car awaited this, that, or the other tending, "we are giving service because we believe service pays.

"Win a man's gratitude through an almost unpaid favor when he's in a tight place, and he will do the rest when he can!

"The last feature on our program of service is inspection of the patron's car at the service station when desired.

"We try to win the confidence of these patrons and ask them to permit us to make these inspections again and again. Often, at the time of repairing trouble on the highroad, we point out to them how the accident, and consequent delay, could have been avoided had this or that part been repaired in time.

"We do not ask—we never urge—that the patrons allow us to make the repair we believe advisable or necessary, but they usually decide for themselves. Tell a man a bolt should be tightened, that his radius rod is loose, that this part needs oiling, that part ought to be greased; and, unless he's fond of doing those things himself, he knows very well that by and by someone will have to do it and this someone might as well be you!

"Inspection and recommendation are free. Patrons pay for repairs, for

other labor, and for grease and oil according to the quantity used.

"We try to make this work an advertisement from the patron to others. Somehow, we believe we're beginning to succeed. Last month we received over 250 calls for service of one sort

Luck.

Luck means rising at six o'clock in the morning, living on a dollar a day if you earn two, minding your own business and not meddling with other people's. Luck means appointments you have never failed to keep, trains you have never failed to catch. Luck means trusting in God and your own resources.—Max O'Rell.

or another. Probably a hundred of them concerned tires. Almost every call, in due course, was followed by an order for some adjustment or repair. Ignition troubles are the next most numerous. They, too, bring other orders in their wake.

"We believe that people are satisfied with the service. We know that they are telling others. In fact, grateful patrons often tell onlookers gathering, as these always do about a disabled automobile, of our work and our price for service, even while our men are busy on the car attending to the repairs.

"As a result, country folks, residents outside the city, are availing

Success and Thrift

I have often been asked to define the true secret of success. It is thrift in all its phases—thrift as applied to saving. A young man may have many friends, but he will find none so steadfast, so constant, so ready to respond to his wants, so capable of pushing him ahead, as a little leather-covered book, with the name of a bank on its cover.

Saving is the first great principle of all success. It creates independence, it gives a young man standing, it fills him with vigor, it stimulates him with the proper energy; in fact, it brings to him the best part of any success—happiness and contentment. If it were possible to inject the quality of saving into every boy, we would have a great many more real men.—Sir Thomas Lipton.

themselves of the work also. They subscribe, not so much for tire changing or the chance of requiring towing, but for the looking over of their car weekly. They believe this alone is worth the dollar a month.

"Folks from anywhere within 20 miles of town come to the city in automobiles on the weekly visit. They ride past the place to the city proper and rid themselves of wares or bundles. Then it's a short ten minutes' dash, at most, back to our place. There they leave the machine to be gone over. They take the street cars at the door to whatever points they are bound.

"While they're gone, we give the car its inspection. Usually the owners tell us to 'go ahead' with minor repairs. Sometimes they state where we may telephone them for consultation before proceeding with more serious matters. Whatsoever, at the time they state, their car is ready. They slip out for it by street car; ride here and there collecting purchases and things to be taken home with them; then proceed on their journey, leaving us the profit on a neat bill for repairs."

A dollar-a-car-a-month is paying so very well, in fact, that the Heucks are considering improvements which will offer other service.

A slight additional rate for teaching any adult of a car-owner's family to drive the car and help himself in minor emergencies may be proffered to those wishing it.

More important, a flat rate of so much a year, payable monthly, is being arranged; the payment of this to guarantee keeping the subscriber's car in absolute repair for the year. Naturally such a subscriber pays for parts used, at a fair profit to the concern. Naturally he is presumed to buy tires, gasoline, oil, and other such things.

Nor will it be from the payments for service for the year, the bills paid for parts, or for things bought besides, that the big garage will profit here, as it isn't on these things alone that it is doing so well with the dollar-a-month service already in force. A pleased customer is the best advertisement obtainable, the business axiom has it and the Heucks believe they can make every customer a really pleased one.

Doing so, they will turn him forth in his car, a continual advertisement for their service—a motor enthusiast among motor enthusiasts on the highways—preaching, at no cost to themselves whatsoever, the gospel of taking advantage of their service of a dollar-a-month-the-car for the service suggested; or, better still, paying just so much monthly for the incalculable comfort and satisfaction of having one's car kept ship-shape twelve months of the year!

How Advertising Aided Garageman

His Garage Wasn't in the Garage Section of the City, but That Didn't Trouble Him—He Figured, and Wisely, That He Need Only Tell Folks Where His Place Could Be Found—Courtesy and First-Class Service Did the Rest

By George C. Mason

"There wasn't anything wrong with the Bell Garage," declared Mr. Bell, himself, talking to a business friend, "except that it was a little off the beaten path—a little away from the big business center of the city. And I charge that as being the sole reason why I did not receive the great amount of patronage I had hoped for—at least that is what I thought at first.

"Then the more I considered the matter, the more it occurred to me that the scarcity of business wasn't altogether because my place was a little off from the great garage-infested district, but because automobile owners did not really know *where* the Bell Garage was located."

"You see," he continued, "the city has garages galore. Most every street running either way from the center of the city can boast of several garages, all strung along in a line. The motorist—especially the transient—selects one, hit or miss. Sometimes it is a good place, and sometimes it isn't. These garages, with perhaps a few exceptions, make no attempt to get trade. They are there and the car owner can come in, if he wants to.

"Well, just to get away from the congested district, and also because I had presented to me what I considered a good buy in real estate, I decided to locate about a mile away from the center of the city. I have a good garage—one of the best for many miles—and I give good service."

"And you certainly appear to be doing a good and profitable business. I guess you made no mistake in your location," ventured the business friend.

"Yes, business is good now," agreed the garage owner, "but I certainly had

one devil of a time getting it, although it wasn't so hard after I hit on the right way to go after it."

"Seems to me it would be rather difficult to get them coming out here when there are garages right in the center of the city," said the friend. "It must have been a tough proposition."

"At first, yes, but as I said a moment ago, not now. Now, they know

to do would be display over the door a sign bearing my name, throw open the doors of the garage, and then sit back in my office chair and watch the police reserve hold back the crowds.

"Well, when business absolutely refused to come my way, I got my thinking cap on during the few rational moments I had at my command. After several sessions of deep digging into my brain palace, I concluded that the

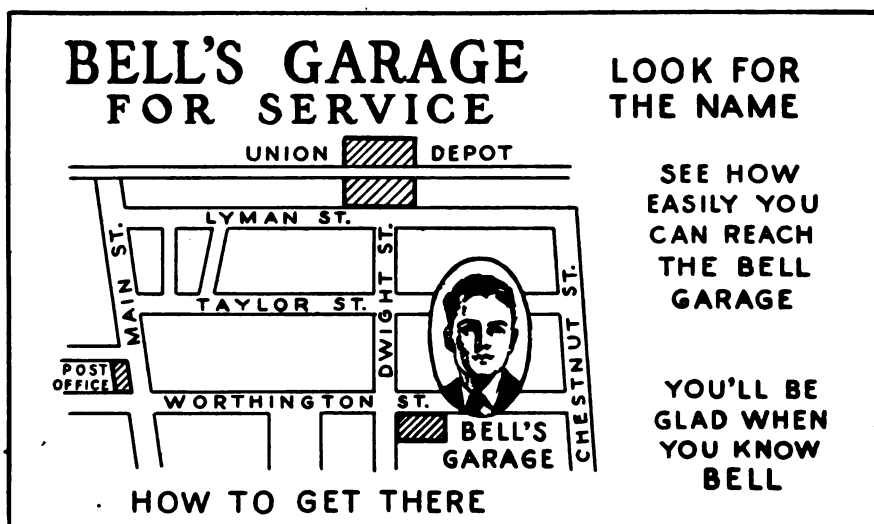
real reason for the present unprofitable condition of affairs, was, as I said before, not because of where I was located but because people didn't know *where* I was located—didn't know how easy it was to reach me, and in fact, never heard of any such place as the Bell Garage. Where was it anyway?"

"And so you told them where you were—and that was about all there was to it. They came around

looking for you." Bell's listener took up the suggested thought.

"Yes, I told them. I set about planning how to become more widely acquainted. After reviewing many publicity plans and suggestions, both old and new, of which I had heard or dreamed about, I finally decided upon a somewhat original though very simple little stunt. The plan brought results. You can see that my place is kept busy all the time."

Bell smiled a smile of perfect contentment, as he added: "This little idea, I believe, will prove of value to other garage owners, as well as to owners of accessories and supply stores and automobile agencies, wishing to reach out for more business, regardless of where their place of business may be located; whether in the big business district or in the suburbs."



Bell's Garage Used Novel Post Card Advertising.

me and know where my place can be found," smiled the garage owner. "I guess you can get the business no matter where you may be located—if you get after it right.

"I usually have more trade now than I can accommodate. I find there are a lot of people who prefer to come out here, away from the bustle, excitement and general mix-up encountered in the heart of the city. This is especially true of the better class, both men and women.

"I can laugh over it all now, although it wasn't any laughing matter at one time," continued Mr. Bell. "I worried night and day because I thought the Bell Garage was an elephant on my hands and I kicked myself for a fool for tearing away from downtown where there was plenty of business. I thought, as many other business men have thought at the beginning of the game, that all I'd have

"I'm quite anxious to hear of that little stunt of yours that has worked out so well," continued the garage owner's business friend, "Do I get the secret, or is it a secret that must be kept?"

"It's this way. I decided to draw up a small map showing just where the Bell Garage stands," Mr. Bell continued, "and how easily it can be reached from the Main street and from several other streets. A cut of the map was next made and then printed on private mailing cards. The cards I used are about the same size as the regulation post card, but of pure white stock of a somewhat heavier grade."

The accompanying sketch shows just how Mr. Bell's map appeared, the name of the Main street and all streets leading therefrom, and also streets leading from other much traveled thoroughfares to the Bell Garage, being plainly printed. Just above the square representing the garage appeared a small photograph of the owner. On the face of the card, to the left in the space reserved for writing a message, appeared this:

**How to Reach
A Good Garage.
A Place You
Should Know About.**
(See other side.)

"I give this postal full credit for starting things," declared Mr. Bell, "but I give Bell service credit for holding the business. Those postals I mailed quite freely to automobile owners in all directions. They brought almost immediate results—and they are still working. I felt confident when I decided to try this plan that it would help boost business to some extent, but I was greatly surprised and immensely pleased to find that the idea worked out better than I had dared to hope."

"While, as might be expected, considerable of the new business was received from just 'once-in-awhile' customers, many of the newcomers have become regular and valued patrons," added the garageman.

"And about the service?" queried the friend. "That is what held the business?"

"Most certainly, service is the thing," declared Bell, positively. "I just wanted to get the people coming. That was the big idea in the beginning—to get them coming—to get those who did not know about the Bell Garage to give the service a trial. I

felt certain I could hold them. And now the big idea is to do so."

"I not only employ reliable and experienced help, but I make it a matter of personal concern to ascertain that every customer fares well and is completely and entirely satisfied. Even the best of help will sometimes, as you probably know, become indisposed and not over-exert themselves to please patrons. This is especially true when the customer is one who is a little more particular than the general run of garage patrons, or one who never comes across with a tip or a cigar or other little remembrance."

"I do not approve of tips for my help, but I never saw any of the boys turn one down when it was offered. I keep my 'weather eye' open for such cases, and when I note that a customer, either by word or action, is displeased with the service rendered by any employe, I 'get there' promptly and straighten the matter out as quickly and as tactfully as possible, so that my patron goes on his way with a pleasant smile and a 'so-long' instead of a frown. It isn't good policy to permit anyone to get away carrying a hunch of dissatisfaction."

"I really don't need to send out any more of those postals," concluded Bell, as his friend was about to depart. "Business keeps coming in right along, now, unsolicited. My customer friends do the boosting for me. 'A satisfied customer is the best advertisement' is an old saying and a mighty true one."

Committee Meeting on Revision of Tire Specifications.

Last month a meeting was held at the United States Bureau of Standards, Washington, D. C., for the purpose of discussing government tire specifications. The Motor Transport Corps, as a very large user of automobile tires, is particularly interested in this problem, and they assisted by sending announcements of the meeting to various tire manufacturers.

Representatives of the different companies were particularly requested to be present and in addition the government was represented as follows: War, Navy, Treasury, Agriculture, Interior, Commerce, and Post Office Departments, the Panama Canal, Shipping Board, Compensation Commission, and the commissioners of the District of Columbia.

At the meeting, ways and means for

revising government tire specifications with the view to adopting better standards were discussed. Specifications for tires which the Bureau had prepared were submitted to the committee for discussion and the various members suggested such changes as seemed desirable.

The committee decided to send a copy of the specifications, together with these recommended changes, to the Rubber Association of America for consideration and possible further revision. The specifications and the resulting changes are then to be returned to the Bureau of Standards, when a second meeting will be called for further consideration of the problem. When completed, these specifications for tires will be available to the various branches of the government, to municipalities, and to private corporations that buy tires in quantity.

Service Managers Against Mechanic and Garage Licensing.

In a recent service bulletin, the National Automobile Chamber of Commerce reports that the replies received to a questionnaire sent to factory service managers, regarding legislation contemplated in several states requiring the licensing of automobile mechanics of garages, developed three main conclusions.

1. Appreciation of the need of improvement in service.
2. Distrust of legislation as a means to obtain it.
3. Belief that a better remedy is the education of mechanics, and the attraction of more real business men into the garage business.

The predominating opinion seems to be that licensing, even if ideal in theory, would be dangerous in practice, especially mechanic licensing. A large majority opposed that form of licensing, but there was slightly less opposition to garage licensing.

If mechanic licensing were adopted, it seemed to be generally agreed that classification of mechanics should be a part of it.

The main objections to either form of license are: That they are class legislation and discriminate against the automobile industry; that they are impractical and impotent to accomplish their purposes under the usual political administration; that they would restrict competition, increase the cost of work, and would be merely another form of tax.

Accounting:

Another of the Series on Garage Accounting — A Detailed Discussion of the Various Subdivisions of the Income and Expense Accounts — We Shall Be Glad to Have Any Criticisms or Suggestions That You May Have to Make Concerning the Chart — Quiz Questions

By J. Newton Boddy

This month we complete the discussion of the accounts given in the Chart of Accounts, taking up and defining the various subdivisions of the Income and Expense accounts.

Sales: This account represents the results of total sales including service or labor. In other words, it represents the results of sales of new cars, used cars, trucks, used trucks, trailers, tractors, tops, bodies, parts, supplies and accessories, tires and tubes, gasoline, oil and grease, alcohol, radiators, batteries, storage, livery, wash and polish, vulcanizing, battery charging, upholstery, repairs, scrap, etc.

While it is true that no garageman or automobile dealer will have all these departments, still each department of business should be carried separately. Nearly every automotive dealer may subdivide his sales into at least eight departments. Each

garageman must decide for himself the number of departments he needs.

Since the sales account represents the total sales, it follows that memo records and accounts must be kept for the details of our sales.

Credit this account with the amount of sales as shown by the sales tickets or invoices or memos. Debit this account with the cost of sales as shown by sales tickets, invoices, or memos. The balance will represent the gross profit on sales.

In this connection it may be well to remind you that prepaid charges, postage, insurance, freight, express, war tax, carrying charges, etc., must not be included in the sales but should be shown as a credit to their respective accounts.

Cost of Sales: This account represents the cost of sales as shown by sales tickets, invoices, memos, or inventories. There are several methods of figuring cost of sales. First, by figuring in detail the cost of each sales ticket, invoice, or memo; second, by using a fixed percentage of mark-up for each department of sales; and third, by figuring from a physical in-

returns are caused by a variety of reasons, and, in order that we may keep a better track of them, we open up a separate account.

The total debit of this account is deducted from the balance of the sales account and shows us the gross profit on the net sales. There are several ways of handling returned sales, but we will discuss but this one, as we believe it to be the simplest and most direct.

Sundry Income:

This account represents income received from non-operating sources such as rent, sale of power, sales of fixed assets, furniture and fixtures, equipment, etc., from commissions on insurance or commissions on outside sales. Very often sales of scrap, waste, etc., are carried under the classification, "sundry income" rather than sales.

Sundry Deductions:

This account represents losses sustained

from non-operating sources and from sales of assets. All sundry additions to, and deductions from, income should be shown in detail in the books and a separate account should be opened for each account.

Interest and Discount: Interest earned, discount earned, interest allowed, discount allowed, should, for good accounting and income tax purposes, be shown as separate items. They should not be shown combined as interest and discount earned and allowed give net results; these accounts, however, may be combined as interest and discount allowed and interest and discount earned.

In interest and discount allowed is included interest on notes payable,

Assets:	Liabilities:
Bank.	Notes payable.
Cash.	Accounts payable.
Petty cash.	Notes receivable discounted.
Liberty bonds.	Deposits payable.
Postage stamps.	Pay roll.
War saving stamps.	Accrued payables.
Notes receivable—less allowance for doubtful.	For a corporation:
Accounts receivable—less allowance for doubtful.	Capital stock.
Deposits receivable.	Surplus.
Merchandise—less allowance of depreciation.	Profit and loss.
Unfinished jobs.	For an individual or partnership:
Shop equipment—less allowance of depreciation.	Investment.
Office equipment—less allowance of depreciation.	Undivided profits.
Buildings and real estate—less allowance of depreciation.	Profit and loss.
Investments.	
Deferred charges to expense.	
Income:	Expenses:
Sales.	Service.
Cost of sales.	Sales.
Other income.	General or administration.
Additions to Income:	Deductions from Income:
Interest earned.	Interest allowed.
Discount earned.	Discount allowed.

Chart of Accounts Gives the "Present Worth" and "Results of Operations."

ventory. These three methods are listed in their order of merit for the garageman.

Cost of sales in case of merchandise means invoice price plus delivery or transportation charges. In case of service or labor sales, the cost represents cost of labor used with cost of supplies or material used added. Cost of sales is a clearing account and shows no balance.

The cost of sales account is debited when merchandise or labor or supplies is credited, and is credited when the sales account is debited.

Loss on Return Sales: As we take a profit on each sale at the time of record, so when we get a return of a sale or part of a sale, we must take a loss or cancel our shown profit. These

bonds, and cash discounts on sales. In interest and discount earned is included interest on notes receivable, bonds, stock, securities, and discount on purchases other than trade discounts.

Interest on investment may be figured in the case of partnerships, but must be charged against the capital accounts rather than profit and loss. Interest and discount should seldom be shown charted with expense accounts.

Where interest takes the place of rent, it is considered good accounting to chart interest among the expenses.

Where heavy loans are carried in order to carry excess stock, it is good accounting to consider this interest on expense but it is generally poor business that causes this charge.

The distinction between cash discount and trade discount is that trade discount is not dependable on prompt payment while cash discount is.

Sales Expense: This account should include all expenses directly incurred for and by the sales departments. This being the case, there are few items in general expense that do not directly affect the sales expense.

To the accounts previously enumerated in general expense, must be added the purely sales expense accounts, salesmen's salaries, commissions, salesmen's expenses, demonstrative expense, free service on cars, trucks, depreciation on used cars, depreciations on demonstrators, depreciation on salesroom equipment or stockroom equipment, and bonds for salesmen.

When any item of expense shown in the general expense chart is chargeable to sales expense alone, charge it directly to this account and not through the general expense account.

Debit with direct sales expenses as they accrue, with sales portion of service expense, with sales portion of general expense.

Credit with amount of rebates and allowances on sales expense invoices, with portion of sales expense charged to service expense.

The balance represents net sales expense chargeable to profit and loss.

Service Expense: This control ac-

count includes all expenses incidental to the departments where labor or service is involved instead of merchandise such as: repairs, vulcanizing, batteries, charging batteries, upholstering, livery, storage, washrack, etc. It also includes pay roll, outside labor, supplies, rent, heat, light, power, insurance on shop equipment, insurance for employers' liability, taxes, depreciation on shop equipment, depreciation on shop, service portion of general expense, service portion of sales expense, etc.

The most serious and most preva-

clude in general expense all expense accounts until we have definitely decided which department of the business they affect. In other words, we use the term "general" to mean unapportioned.

When we have definitely distributed all our expenses, the balance remaining unapportioned is usually called "general expense." This is really what is known as "administration" expense or expense pertaining to the business as a whole.

The test for the distribution of expense is to determine whether it af-

flicts the service departments or the sales departments. The service departments are those involving labor or service and the sales departments are those involving merchandise sales. There are very few expenses that ultimately remain in general expense. These are generally officers' salaries, life insurance, association fees and dues, trade papers, law and audit, organization expense, possible donations, and sometimes bad debts.

Taxes	Rent
Power	Advertising
Entertainment	Pay roll
Rebates and allowances	Salaries—officers and office
Sales policy	Commissions
Law and audit	Fuel
Gas	Bad debts
Supplies	Insurance
Postage	House truck
Express, freight, cartage (out)	Depreciation
Trade papers	Light
Outside labor	Telephone and telegraph
New car expense	Life insurance
Used car expense	Association fees and dues
Donations	Printing and stationery
Sundry petty expense	Repairs and additions
Loss and damage	Employment and welfare

A Table of "General" Expenses.

lent fault with most garagemen operating service departments is that, in figuring profit and loss on the departments of their business, they fail to include many items of expense properly chargeable against this department. Though their books may accurately show the result of the operation of the business as a whole, they fail utterly to show the profit and loss by departments. Consequently, many owners are playing the losers and neglecting the winners.

Debit with direct service expense as it accrues, with service portion of sales expense, with service portion of general expense.

Credit with amount chargeable to cost of sales or work in process, with amounts chargeable to sales expense, with amount of rebates and allowances on service expense invoices.

The balance will show net service expense chargeable to profit and loss.

General Expense: The general expense accounts cover, for the most part, all the expenses of the average garage owner. To begin with, we in-

Remember this—general expense must be made a distributing station and not a catch basin. If you will but analyze your expenses as they accrue, you will find that 90 per cent of them can be dispatched directly to the department they affect and need never be carried through the clearing station-general expenses. At the end of an accounting period, the balance of all expense accounts, not administrative, should be distributed to sales and service expenses in the same ratio as the direct charges for the same accounts.

Remember, also, that the fewer items carried in general expense, the more accurate the accounting. When officers are active in the business in any way, a proper portion of their salaries is chargeable to the departments receiving the benefits of their services.

Debit with amount of expenses as they accrue.

Credit with amount of rebates and allowances on expense invoices; with amounts distributed to sales and service expense accounts.

The balance will show the net gen-

(Concluded on page 18)

The Other Fellers Always Got the Snap

Every Feller Thinks Sum Other Fellers Got a Snap—Spike Sez That if There's Enny Snap Its a Good Steddy Job with Work You Don't Mind Doing and Fair Pay—But I Aint So Sure Yet That Millionairing Is Such a Hard Job

By Frank Farrington

Deer Pete:

Every feller thinks sum other fellers got a snap, Pete. Aint it the truth? Dont you remember how we ust to be alwys wishing weed get a job in the post offis becaws we thought that was the softest job in town and lots of pay and postal cards to reed and everything? Mebby youre wishing yet you mite be in the P O but I dont want to be now.

I got the ideeah it wood be pretty soft if Ide get a job in a bank. Thoze bank fellers alwys look so slik and nice and the bank shuts up at 3 oclock, but I was talking to Spike about it and he ust to work in a bank and he sed "3 oclock hel they dont get out then. Thens when they just get down to bizness."

Spike says, "Dont you get the ideeah, Bill, that theres alwys sum other fellers thats got a snap. What do you meen

a snap ennyway? If you meen nothing to work at and plenty of pay, then there millionairs thats that way and they hav the hardest times of ennyboddy.

"If theres enny snap its a good stedy job with work that you dont mind doing and fair pay, and thats what youv got rite here, so qwit your crabbing." Spike ought to kno. Heez a pretty wize gink, but I aint so shure yet that millionairing is such a hard job. But I gess Ime pretty well fixt at that.

Persy got balled out agen yesterdie. Youd think heed get sum sens into his beene after a while woodent you? We bin awful bizzy this week and yesterdie morning fokes began cumming along so erly that I had to leev off sweeping the pavement and help sell things and etc.

Well I left the broom in the doorway and, of course, when the boss cum down he saw it and he askt me why it was and I sed I haddent got thru out there yet becaws I had to go and help, and now Bob was going to send me out on an errand and Ide finnish sweeping when I got back.

Persy wassent doing anything just then but smoothing his raiven tresses

it cums to a matter of sailsmunship.

"And if he can sell goods when he aint hired to do it, then you can sweep the walk when you aint hired to. And let me tell you this, if you aint hired for sweeping the pavement youll be fired for not sweeping it, so make your chois while I wait. Sweep it or beet it! Even your mother cant get me to keep you here if you wont do what I tell you to."

Say, the boss dont generally ball ennybody out rite before the rest of the bunch but I gess he cant stand that Persy, and he knoze there aint enny use trying to be decent to him.

Persy went out and swept the pavement but he did as bum a job of it as he rood, and I had to do most of it over agen when I got back. Now whats the ideeah of a feller being like that? Dont he ever want to get along or be ennything or ennyboddy

or is he just going to kick and sulk all his life? You can serch me if I see whats the point.

What differens does it make what a fellers hired to do? Aint it all in the days work and if its helping the boss and the bizness, why not sweep or ennything? Sum fellers is just that finnick, and buleve me it dont get em ennywhere or ennything. A feller thats too proud to hav fokes see him sweeping the walk in front of the garaje better get a job on a airship, seeings as he is abuv everything on the ground.

You dont catch Bob or Spike or Josey or Chick or me refusing to do ennything they is to do, and Bob alwys says that the more things a feller can do, the better man he is to work for sumboddy else and the better heel be at running a garaje of his own sum



Persy Sed He Didn't Hire Out to Sweep the Streets But He Swept the Pavement All Rite Even if I Did Have to Do It Over.

with a pockit coam and the boss sed. "Persy, you go out and finnish sweeping the pavement. Williams got to go on an errand and its time it was all swept off." Then the boss went in the offis and Persy never started for that broom or ennything.

Pretty soon the boss lookt out and saw Persy wassent sweeping and he sed, "Make it snappy, Persy, will you?" and Persy sed, "I aint the porter. I diddent hire out here to sweep the streets. I aint a white wings Ime a sailsmun."

Gee, the boss took about three steps and he was in frunt of Persy. He sed, "Youre a sailsmun are you? Why you coodent sell snoballs in hel. You coodent sell ice cream in the Sara desert. William here aint hired to sell goods but he can sell more goods in a week than you sell in a year when

day. I gess heez rite at that becaws if a feller can do all the things around a store himself, he knoze how theyd ought to be dun and if his men dont do em rite, heel see it.

If I was Persy Ide get a job in sum garaje where I was there becaws they hired me, not becaws the boss was my mothers brother and Ide see if I coodent be good enuf so theyd keep me. I woodent work in sum garaje or store for an unkle or ant or cuzzin or enny relashuns. Not me.

You never get along good working for relashuns or havving them working for you. Ive herd pa say so a million times when ma wood be wishing heed hire sum relashun of hern or wishing her unkle would hire pa becaws heez got a big factory—not pa's got a factory. He aint got enny' factory. All heez got is a woodshed. Ile say heez got a woodshed, Pete. Heez took me out there enuf times.

Now what wood Dazie do working for her unkle? Working for the boss sheel probly get married to him and working for an unkle all sheed get wood be a job, and that woodent sute Dazie. You cant get marrid to a unkle or you cant vamp him enny.

I alwys notist that boys thats working in their fathers stores dont get to be very good clerks. They think theyre part boss and dont haf to do only what they feel like doing and the boss dont make em toe the mark like theyd haf to sumwhere in sumboddys elses garaje?

I ust to be sore becaws I had to toe the mark and fellers I saw working for their fathers had it eezy, but I gess I had the best of it at that becaws I had to do things rite. I had to work whether I wanted to or not, so I lernd and got along and those other fellers aint enny better now than they used to be and theyre getting lazie.

You kno it, Pete. You workt for your fathers store once diddent you, and Ile tell the world you diddent do a darnd thing but sit out on the frunt steps and wait for me to cum and go in swimming with you down to the dam.

Well both of us has to work now but I like work. Ime that way. But Persy, well he aint afrade of work. Ile say he aint. Heed lay rite down beside it and go to sleep but he woodent do enny.

So long old pills and sqwills.

BILL.

Chain of Garages Planned by Ramp Buildings Corporation.

Plans for two chains of garages have been completed by the Ramp Buildings Corp., 115 Broad street, New York City, and work on them will go forward simultaneously.

One chain will be located in greater New York and the other in the Mississippi and Missouri valleys. The chain in the greater New York section will be known as Auto-Apartments, Inc., of greater New York and will

SELECTIONS FOR POSITIONS OF TRUST.

The man who is most to be wanted for positions of trust is the one who does not work for mere selfish gain, but for the love of the task. If he does his work for love of it, and not out of consideration alone for the result he will serve his own interests best, for he will do his work well and thereby make himself indispensable to his employer; and when the time comes to choose a man for a higher position, the choice will likely fall upon him who has done his work well.—William Howard Taft.

consist of several garages in the metropolitan district. The other chain will be known as the Auto-Apartments, Inc., of the Mississippi and Missouri valleys with headquarters in Kansas City.

These companies will be operated as subsidiaries of the Ramp buildings corporation. It is also planned to start a similar subsidiary shortly in the Chicago territory and, as time goes on, it is intended to cover the whole country with subsidiaries operated by the Ramp buildings corporation.

The name in every case will be Auto-Apartments. The first link in the Mississippi and Missouri valleys will be situated in the heart of Kansas City and will serve the business and shopping districts.

All garages erected by the organization will employ the d'Humy Motoramp system because this system has the convenience and economy of common ramp systems, and yet possesses the compactness and flexibility of arrangement of elevators. A ramp, by the way, is an inclined driveway.

Motorists have always preferred ramps because every floor in a multi-story garage then becomes a street floor and the delays and difficulties incident to elevators are avoided, but common ramps have rarely been employed in garages because of their large

bulk, garagemen being unwilling to sacrifice valuable storage space for the sake of adding to the convenience of getting in and out of the building.

GARAGE ACCOUNTING SYSTEMS.

(Continued from page 17.)

eral expense chargeable to profit and loss. This should represent only true administration expense.

In charting or listing of expense accounts, do so in the order of their magnitude, so that, in reading a schedule of expenses, the important items will show where they will be most accessible.

(To be continued.)

Quiz Questions on Garage Accounting.

What do we mean by the term "income"?

What are the sources of income in the garage business?

How many departments of cost of sales should a bookkeeping system show?

What does the balance on the sales account represent?

How is "cost of sales" debited and credited?

What is an account like "cost of sales" called?

What does the loss on returned sales represent? How is it figured?

Define sundry income and sundry deductions.

Where would you chart the account "sale of scrap"?

Define interest and discount.

Why should interest allowed and interest earned be carried as separate accounts?

When is interest and discount an expense rather than a deduction from revenue?

What is the difference between cash discount and trade discount?

List expenses in order of magnitude in your personal experience.

What is meant by the terms general expense, sales expense, service expense and administration expense?

What accounts are strictly sales expense; service expense; administration expense?

Why are general expenses subdivided?

List all the depreciation accounts, insurance, pay roll.

Where would you place office salaries?

What is the difference between general and administration expense? List the administration expenses.



A Malingerer or a Neurasthenic?

Industrial World Has Many Malingerers; That Is, Workmen Who Feign Incapacity in Order to Secure Compensation—But There Is the Unfortunate Neurasthenic as Well Who Is Really Sick Though He May Appear Able-Bodied

By Chesla C. Sherlock

It is common history that any system of paternalistic, beneficial or pension legislation is certain to give forth a number of people who are dishonest enough to want to claim benefits therefrom to which they are not honestly entitled. Pension frauds are common history—one just came to light the other day in Iowa.

The workmen's compensation acts are no exception to this rule. There are workmen who would rather pretend that they have been injured and draw their compensation than to continue at their work. It is hard for a man to feign injury in the first instance and secure an award, but even that is done from time to time.

The worst case the employer has to deal with, however, is the fellow who has had an honest right to compensation, but who does not "recover" and return to work as soon as he should. He is known as a malingerer, who is feigning that he is still incapacitated in order to prolong the period over which the compensation may be received from the employer.

Employers will be surprised at the great number of malingerers in the industrial world. Those who have occasion to administer the compensation acts are constantly being brought into touch with them. They work a great fraud upon the employer, in that they deprive him of money to which they have no just right under the law.

And the only way in which the employer can protect himself is to require that all employes submit to frequent examinations at the hands of competent medical men in order to determine just when the compensation liability ends and they should return to work.

The malingerer will put up a terrific racket about this. He will, in practically every case, suggest that the doctor be changed. Then he will feign all sorts of pain and injury in order to make an attempted *prima facie* showing of incapacity. A good physician can usually trap him, for about all the average malingerer needs is plenty of room and a little time and he will convict himself.

The malingerer is a parasite in in-

dustry and he should be rooted out ruthlessly. It ought to be a prison offense for a malingerer to "sponge" on an employer and upon society in general, when there is absolutely nothing the matter with him or any foundation upon which to base a claim for compensation.

But let me strike a note of warning to employers in this respect. Do not jump to the conclusion that all workmen who have the symptoms of being malingerers are, in fact, just that. You

ADVERTISING AND CHARACTER.

You can believe in the character of any establishment that regularly spends money to create confidence. Advertising doesn't pay if it isn't honest; and it's cheaper to be honest than to pay for unprofitable advertising. Advertising is protection, identification, warranty of quality and of value. No merchant calls attention to himself if he isn't prepared to profit by examination of his wares.—Herbert Kaufman.

have the neurasthenic—a pathetic individual who is coming more and more into the common experience of all employers. He has all the external symptoms of a malingerer and it usually takes the most expert medical skill to distinguish between the two.

What is neurasthenia? It is, roughly speaking, a nervous disease or a disease of the spinal chord which affects the will. It is due largely to some shock or severe strain to the physical structure of the body, which centers in the nervous centers. It is to industry what shell shock was to the soldiers in the army overseas.

Neurasthenia is something which a man cannot help. He may appear to be able-bodied and able to continue his work, but he is of the honest opinion, due to his disease, that he cannot work—may never be able to work again. He worries and frets about it and continues to aggravate his case, thereby prolonging his incapacity rather than shortening it.

There is just this fundamental difference between the malingerer and the neurasthenic: The malingerer is a

fraud and he knows it all the time; he is a fraud for the sole purpose of collecting compensation. The neurasthenic, on the other hand, is, in no sense of the word, a fraud. He wants to return to work, but he is under the honest delusion that he is not able to do so, and this aggravates his nervous condition, causes him to worry more and generally prolongs his condition.

The neurasthenic cannot help his condition and, unless he is very skillfully handled, his incapacity may prove to be a great deal more serious than one might imagine. He may be in that condition for years, just as shell-shocked soldiers are still in our hospitals, apparently no better in health than the day they were carried back from the front lines.

The malingerer is not honestly entitled to one cent of compensation, but the neurasthenic is honestly entitled to compensation if his condition has been superinduced by his employment. A case where it is common is in the structural steel work, in foundries, and in shops where there is a tremendous and continual noise which, sooner or later, affects the nervous system.

Compensable neurasthenia has also been known to develop from a case where a workman witnessed the distressing suffering of a fellow workman who had been injured while at work. It is common in large garage shops where, as we said before, there is more or less continual noise of loud volume.

The employer must keep the two disorders firmly in mind, and he must not jump to the conclusion that all workmen who have the appearance of being malingerers are, in fact, such vandals. In each case, competent medical advice should be resorted to in an effort to do the man the utmost justice.

The medical men have a way of discovering the malingerers and the frauds, and it will not take them long to determine the true status of the case which causes doubt in your mind. But pity the poor neurasthenic! He is the shell-shocked soldier of industry.

Vulcanizing An Art Worth Learning

Honest Repairing Will Place Tire Repairing Business on Right Basis—The Best is Cheapest in Selecting Materials—Comparative Tests to Determine Value of Materials Used for Repairs—Take Plenty of Time for Job; It Pays

By J. N. Bagley

"Where are you going today?" Jack McNeal asked Lewis Kay as the latter rushed into the garage for his car that he had left there the night before to have a little repairing done on the top.

"Just over to Bellair," replied Lewis, as he looked about the building for a water bucket to fill his radiator.

"Say, Lew, your front wheels are out of line and you have a bad tire on that left front wheel. Better have it fixed before you start, don't you think?"

"Fix nuthin'," returned Lew. "I have had plenty of experience with repaired tires and, as to the wheels being out of line, they suit me all right. You fellows are always looking for something to make a man leave some money with you."

"Well," returned Jack, "that's my business—but I always try to give a customer something for his money. Your steering gear is in bad shape and I don't like to see you drive it that way. It's dangerous."

Kay did not answer, but cranked up the old car and headed out at the north door while Jack watched him round the corner and start down the road, running about 30 miles per hour. He shook his head as he closed the door and remarked to one of the workmen:

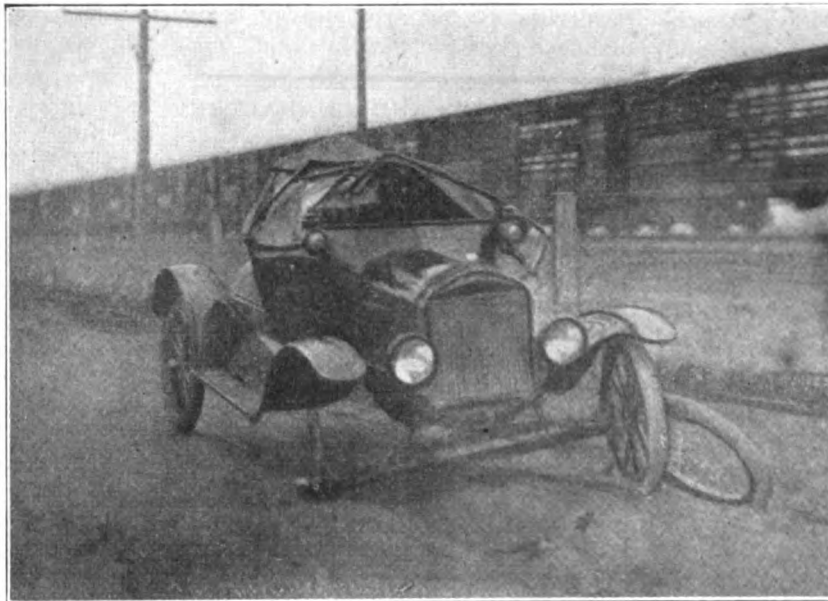
"Some of these days Lew Kay will have an accident, now you just see if he don't."

"Maybe he will, but you can't tell him anything. He is one of those fellows who thinks every garageman in the country is trying to graft him. He has had tire repairing done all over the country. Because not much of it has ever amounted to anything is the reason he won't let us try it for him. I am going to repair one tire for him free of charge just to show him the difference between our work and the kind he has been getting over the territory," remarked Ed as he wheeled and went back to examine a tire that was going through the process of vulcanizing.

"Don't think there is any use, Ed, he has been 'hooked' so many times he won't even listen to you," answered Jack, as he

opened the door for Mrs. Smith to drive in.

An hour had elapsed when the telephone rang and Jack answered. The call was from Lew Kay. He had had the very accident that he had been warned against only a short time previous. Racing with a freight train, the tire on the front wheel did not stand the strain, and he was wrecked in the road. Fortunately he escaped without injury to himself, but the car was



Lew Had the Very Accident He Had Been Warned Against.

badly jammed up—all because he would risk the loose steering gear, the wheels out of alignment and the tire in bad condition.

Lew was badly bruised but had no bones broken. When he was towed in, the boys joked him about his accident and asked him why he wouldn't listen when they advised him of the dangers.

"Well," answered Lewis, "it is this way. Over all the territory I cover I have never been able to get a tire repaired that gave me any service, so how was I to know but what it would only be a repetition of the same old 'seven and six 'get your money'? But I am going to give you fellows a chance to prove to me that you can deliver the goods. Fix up the tires, line up the wheels and tighten the steering gear. I've nothing more to say, only put her in shape," and Lewis walked out nursing a bump just in front of his ear.

The next day the job was turned over to him, and he was perfectly satisfied after giving the car a thorough try-out.

How many times have we heard men remark: "I never had any service out of repaired tires. They are either under-cured or cured too much, or there is something else wrong." We have heard it entirely too often, but there is a reason for it and this reason should be looked into, for thousands and thousands of dollars' worth of tires are going to the junk pile each year that could be made serviceable if the user had

not had much the same experience as the one just mentioned. Vulcanizing tires is an art. It has made much progress in the last few years and it is going to make a greater progress in the next few years, especially if more men get at it like Jack McNeal.

Vulcanized tires go bad for various reasons but after totaling up all the reasons, we have wrong policy or no policy at all. There is but one policy that is going to place the tire-repairing business on the basis it should be—and that is honest repairing regardless of cost. Until this time comes, there will be dissatisfied customers, and there will

also be many tire-repair men go out of business for the want of something to do in their line.

In the first place, many repairmen make a great mistake by undertaking to repair a tire that should be discarded. Therefore, the first essential is to be able to judge the tire that comes to the shop and if it does not look like it would give service after it is repaired, tell the customer why and show him.

Of course, you may need the business, but if you expect to stay in the business, it is better to lose that particular job than to lose the customer for all time besides throwing a monkey wrench into the wheels of the vulcanizing machinery which must more or less affect the art in general.

Next in order are the materials used in making repairs. The best is the cheapest and there is no such thing as "just as good." Buy one particular brand of repair material, get used to working it and, if it gives satisfactory results, stick to it.

Jack McNeal many times takes a chance with a tire that looks fair, but he always tells the customer to use it and test it before he pays for it. In case it goes bad, he never accepts pay for it. He makes a note of the particular tire and never tries re-pairing another in a like condition.

Good workmanship and good materials walk hand in hand. Of course one must know how to handle the good material in order to get the best results. Only a short time ago the writer heard a vulcanizer condemning a certain brand of cement, saying it was no good and that he was going to send it back. While he was talking, the salesman came in and he at once started in on him. The salesman said he would be glad to take it back if it was wrong but first he wanted to test it out to ascertain, if possible, the trouble.

This salesman was a mechanic and thoroughly understood his line from A to Z. He stayed the greater part of the day instructing the vulcanizer in the use of his materials. There was nothing wrong with the cement. The vulcanizer did not allow it sufficient time to dry. The repair will in every instance separate if the cement is not thoroughly dried and, again, the job must be cooked just right.

On one other occasion I saw a vulcanizer cooking his tires and guessing at the steam pressure as his gauge was broken. Some of the jobs turned out were fair while others would not stand up at all. All the while he was blaming the repair materials when, in fact, it was all his own fault because he was guessing at the steam pressure.

The matter of steam pressure is of such great importance that it cannot be too strongly emphasized. When the steam pressure is raised in order to hurry the job along, mileage must be sacrificed for speed. It is unwise to expect a stock compounded to cure perfectly at 40 pounds, to cure equally well at 50 or 75 pounds. Therefore, when steam pressure is raised to expedite matters, you are endangering the quality of your work and driving away trade.

Sixty minutes at a given number of pounds steam pressure should be closely adhered to for it is the original cure of practically all tires at the time of manufacture. When tires are again re-cured at the original pressure, no appreciable harm is noticed, but on the other hand if this pressure is raised to 25 or 30 pounds over the normal point, many changes immediately take place inside the tire. The outer surface of the stock is glazed over by this sudden application of too high a temperature before the heat has had time to penetrate the tire.

As a rule, about 60 pounds is the correct pressure for the tube plate and 40 pounds for the sectional mold. Many vulcanizers try to strike a happy medium with say 50 pounds, and there is where they make a very serious mistake. The stock that is supposed to be cooked at 60 pounds is 10

pounds undercured, and stock supposed to be cooked at 40 pounds is 10 pounds overcured, making a partial failure in both instances.

One other little trouble that I have noticed from time to time is this: The vulcanizer gets up his steam pressure anywhere from 40 to 60 pounds and starts curing the job and allows the pressure to gradually creep up unheeded, or if he does notice it, he probably attempts to regulate by closing the valve a trifle. Again I have

Success' Chief Essential.

The chief essential to success is to recognize that today's opportunities are much greater and more numerous than those of yesteryear. Let your mind dwell not on the accomplishments of the past but on the possibilities of the future, for in that way only can you vision what these possibilities are and how to attain them.

A hundred years hence men will look back to this day and say what wonderful opportunities there were and how few were there who saw them and worked hard enough to grasp them. — The Armour Magazine.

noticed that leaky connections cause a falling and uneven pressure.

All of these things work against a gradual, even cure and must be watched closely if the job is to be turned out in a workmanlike manner with the expectation of the job giving service to the user. Even pressure is an absolute necessity from the time the job is started until it is finished regardless of the time it takes.

There are a number of types of regulators on the market which can be attached to the vulcanizer, in case it does not have one. Every vulcanizer should be equipped with one, and it will pay for itself in the first two or three jobs, for when we take things "for granted," we don't always come out on top in this world. The correct pressure and the exact time for the continued pressure together with the proper materials correctly handled make for a good job and should be closely adhered to regardless of cost.

The plan of using off-brand materials is quite a little like selling off-brand tires—though worse, if anything. If you will notice and consider the really successful tire merchant and notice the vast majority who handle only standard makes of tires, you will also notice that 99 per cent of their success is due to the fact that they stick to the standardized tire and do not shift from here to there handling a little of this and a little of that from now to then. But, at that, most of them somewhere along the road have had their eyeteeth cut, and we should profit by their experience.

The development of the vulcanizing business, like every other business, must be built upon a firm foundation of business

principles, and stock of a doubtful character must sooner or later be eliminated. The tire repair business is worthy of confidence, and it is up to the man in charge as to the extent of the confidence established. Once the confidence is permanently established it is an easy matter to continue if care is exercised in choice of materials.

A carpenter spends months or even years learning his trade. He uses only materials that will give the best of service. Supposing he had been doing carpenter work in a certain territory for a long period and then would go to using a low grade of lumber full of knots, etc. How long would it be before every man in the whole country would know about it?

Same way with the vulcanizer. He can do good work for a long spell but one batch of poor material will go a long way toward tearing down the reputation that it has taken months to establish.

You will notice that the man who is running the shoe repair shop successfully, will tie to a certain brand of leather, and you can't pry him loose with a crow-bar. One thing I have noticed in every line the country over—the customer always goes back to the man who did the work. He never stops to consider the factory that furnished the material. It costs more sometimes to use the better materials but it's worth it. "Quality is remembered long after the price is forgotten."

Now, then the repairman will say, "How am I to know when I am buying the best material? How can I tell whether a certain material will combine with my workmanship to make it possible to produce the most serviceable job for my customer?"

It is a fact that it requires technical skill and knowledge to judge repair material and many times the expert is fooled in his decision. The only sure way is to experiment and find a material that gives service, and stick to it. I have seen clever salesmen do stunts and tricks with inferior stock and make the sale—actually making the vulcanizer believe it is the very thing he has been needing for years.

But when the material is put into the tire and the tire is placed in actual service, he finds, to his sorrow, that he has made a mistake. But it is too late—he has lost the time and material, and he has also lost the confidence of a customer which he, no doubt, has been establishing gradually for some time.

There are, however, a few tests that can be made that will help the vulcanizer to decide between two pieces of stock. For instance, take two pieces of stock and cure it on the tube plate the time recommended by the manufacturer. After removing it and it is cool, take a pair of scissors and slowly cut it into strips. The better grade will cut smooth while the grade not so good will seem to have grit in it.

Tearing the two pieces and noting the strain is another test worth while. Take a strip of each and stretch it as far as

it will go and hold for 15 seconds. The piece that comes the nearest to returning to its original shape will be the better piece in every case. It will in every instance determine the quality of the two pieces when they come to real road service. The piece that stands this test best will best resist the abuse from sticks, etc.

A few experiments will be described that will help determine the value of one friction fabric over another.

Take two strips of friction fabric and cure together two ends on the tube plate the given time. Then attach one of the loose ends to a spring balance scale and to the other end apply weight until the cured ends begin to separate slowly. Note the time it takes for the two pieces to be separated, also the register in pounds on the scale.

Comparative tests can be made this way with different materials but care should be taken to have all strips the same width or one will have the advantage over the other.

Next, look after the cement. To determine the quality of cement, coat two pieces of fabric with it and allow it to dry as directed in the manufacturer's instructions. Then make the test as just described for the fabrics.

Care should be taken in making these tests as the ordinary tube plate will have a slight tendency to over-cure the piece on the bottom. It is not a bad plan, however, to cure three or more strips together and remove the lower one, making the tests on the remaining strips.

One other point, which should always be borne in mind, is the weight of the materials used for repairing. Material must be of lighter weight than that used in building the tire because it is impossible to get as much pressure on the repair section as was used on the tire when it was made. Otherwise there will be an ugly bunch where the repair is made. The repaired section does not want to be thick and unyielding but, instead, must be resilient like the rest of the tire. The light weight material is, therefore, necessary in repairing.

In nearly every instance, 14-ounce material is ideal for rebuilding the body of the casing, while building stock as light as 8 ounces is better for the bead. The 8-ounce stock will be about the right weight for bicycle and motorcycle tires.

There are a number of different kinds of fabric on the market but the one best adapted for general repair work is one having a fiber averaging about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches long. This, coated with a heavy coat of gum, makes the ideal repair material. Of course, the heavy coat of gum will at first make it appear thick, but when the heat and pressure is applied, the gum is forced into the fabric until it is not noticeable when the job is finished.

Another mistake many vulcanizers make is in not using a breaker strip fabric which fact, doubtless, accounts for many cases of separation between tread and carcass. One

should use a good strong open-weave breaker strip which will enable the tread and cushion stock to be cemented together with hundreds of small rivet-like threads of gum.

When cushion stock is used and correctly vulcanized, it not only provides a close and lasting union between the carcass and the tread, but it absorbs and distributes road

NO LABOR, NO REWARD.

There is no reward without labor. There is no excellence without study, and there cannot be any compensation without toil. The man who preaches contrary gospel is doing a thing that would undermine the American republic. I speak the truth—and I know what I am talking about as a printer and publisher—when I say that the sweetest enjoyment in the world is that of accomplishing toil.—Warren G. Harding.

shocks and bruises and prevents the tread becoming loose in service. Tire manufacturers use breaker strips in building tires. Why, then, is it not just as essential that it be used in repairing?

Again, the service the repair renders the user depends, to a large extent, upon the cushion stock used. As a rule, good cushion stock contains very little compound and, for this reason, unites very readily with both tread stock and fabric friction. The one object in view in compounding tread gum is strength and wearing ability. On the other hand, friction is less heavily compounded and is, therefore, more elastic and soft so to speak. To unite the two with any degree of success would be impossible. Therefore, cushion stock is placed between them, being compounded to such an extent that it readily cures to friction and tread stock alike.

There is quite a difference between tube and casing stock and one should not be used to replace the other. The best tube gum for repair purposes is the one which cures quickly, stretches with the tube, and when cured does not chip or crack and pull loose from the tube. The tube stock should be of the quick-curing kind, for the reason that most customers come in with a rush order. Aside from this, there is still another reason worthy of consideration:

With a slow-curing gum, there is always danger of over-curing or burning the tube at the place of repair. All of us have, no doubt, seen tubes that have been repaired and all around the vulcanized patch the tube was less resilient than the body of the tube. This is the result of over-cure and it will be only a very short time until the tube will crack and leak making it necessary to either discard the tube or put in a new section.

Certain tube gums on the market, when used alone, can be cured in about five or seven minutes at 60 pounds steam pressure.

For all holes, except the tiny ones, a reinforcement should be made inside the tube with what is known as a back stock, in which case it will require a longer time to cure, say 10 to 15 minutes.

Cement should always be used unless two uncured surfaces come together, in which case it is not necessary. No cement is used between plies when building up a section as the skim coat of one-ply cures and unites perfectly with its neighbor.

In repairing tubes, the raw stock must be united with the cured stock. The same problem is met when uniting uncured repair stock with the carcass or tread of the tire with a sein and cured stock. In a case of this kind, the gum will refuse to penetrate into the cured surface sufficiently to have any strength to speak of.

For this reason, two or more coats of cement are put between the surface to be united. In this instance the solvent acts as the carrying agent and makes the perfect union possible. Since this is a known fact that the ingredients of the cement go into the surface of the stock, it is reasonable to see that the two must be thoroughly mixed—in other words, the cement must be of uniform consistency.

The gum and compound, if allowed to settle apart and not stirred up before being used, will separate sufficiently to make a good union. Therefore, the solution is for the manufacturer to make the best cement about twice as heavy as it can be used. By thinning or cutting down as it is needed, the results are a great deal more uniform than could be expected in case it was thinned to the proper consistency at the time of making.

It might be mentioned that the highest grade cement is the most difficult to cut, for the reason that it contains more pure gum and less of the compound. Pure gum will not be dissolved as readily as gum containing more of the compound. Hence the greater the percentage of pure gum, the longer and slower the process of cutting. But after all is said and done, the extra effort is well worth while.

Use only the high test gasoline or, if obtainable, use benzol which is still better. Low-grade gasoline should not be used as it contains more or less oil which has a tendency to destroy the adhesive qualities and prevents the cement drying as it should.

When cutting down a quantity of cement, the solvent should be added a little at a time and plenty of time taken to do the job right, as it pays big dividends in the long run. Cement must have a tacky surface if good work is to follow.

When all vulcanizers are careful with their work and use only high grade material, the time will have come when these fellows who are in the habit of saying, "It doesn't pay to have tires repaired" will change their song to, "I'll take that tire to Brown to be repaired and it will be just as good as new." And they will be right, too!

Welding, Cutting and Brazing Practice

Methods Employed in Filling Scored Engine Cylinders by the Oxy-Acetylene Process—The Preheating Operation—A Special Rod Is Sometimes Found to Be More Convenient Than the Common Straight Filler—"Roughing Out"

By David Baxter

There are on the market today several metallic compositions for the filling of grooves in scored automobile engine cylinders. Some of them are, no doubt, useful in their places; but they are more or less a makeshift, even where the work is expertly handled, because the filling doesn't become a part of the original casting. It is merely adhered to the surface, soldered, so to speak.

There is no doubt but that this is sufficient so far as it goes, but the fact remains just the same that any of the soldering processes can not be as good as fusion welding, for where the score is properly welded with the oxy-acetylene flame, the added metal becomes a part of the original cylinder bore. It is not adhered to the surface, but is fused with the bore metal, becoming in effect a concrete whole.

Of course, the welded score costs more, but that is what the solder was invented for—to enable automobile mechanics to turn out a quick, cheap job.

The weld requires greater skill and takes more time, which is as it should be to produce the best result. In the soldered score, the filling metal and the cylinder metal are so radically different that chemical action is liable to set up at any time to destroy the adhesion, while the welded score is of the same metal as the cylinder and will, therefore, result in no such action.

The melting point of some score solders is comparatively very low too, a great deal lower, in fact, than the iron of which the scored place consists. But where the scored

possess a melting point high enough to preclude the danger of melting in service, there is no telling what would happen if the engine were allowed to run dry. The welded score eliminates this anxiety too.

However, this is not exactly a discussion of the merits of either system in particular; it is intended to be an exposition of the methods employed in filling scored automotive cylinders by the oxy-acetylene process. In going into details of this, we will take a specific example and follow it through the different steps of the process, as has been the custom in former articles.

Aside from the difference in the bore size, there are two general kinds of cylinders with which the welder has to deal—one where the bore is open at both ends like the Ford block; the other where one end is closed, like that shown in the accompanying illustrations. The former is probably the easier to weld because it can be arranged so the torch operator can see more clearly how the weld is acting under the flame. He can also work at both ends if the score runs entirely through.

With the closed type he must do all the welding from one end, which makes the handling of the torch and filler rod a very delicate matter. The closed end not only cramps the working room, but affords poor light in which to judge distances, and examine the finished weld.

Of course, weight and metal thickness of the cylinders influence the welding as does the shape of the cylinder, whether it is "en bloc" or single type. These things make a difference, mainly in the preheating, however.

It is easily recognized that a six-cylinder block will need more careful attention in regard to preheating than a single cylinder such as the example given here. When this is boiled down, however, it is really only a matter of enlarging or extending the preheater fire.

The theory of filling the scores is practically the same on all types of automobile cylinders, because the metal thickness varies but little in the different engines.

Taking the cylinder shown in the illustrations, the first step is to thoroughly clean the bore. All grease and carbon deposits are carefully wiped out, especially the groove formed by the score. This cleaning is probably more essential than most other welding jobs on account of the surrounding slope of the walls which tends to feed all dirt and other impurities directly into the weld.

Cleanliness is particularly essential in

score welding because the added metal must be soft enough to machine readily, and it must be free from pin holes or porous spots. Outside impurities tend to cause these very things—bits of slag or dross are trapped in the weld either in a gaseous or



Fig. 2—"Roughing Out" the Surplus Filler Metal of the Welded Score.

semi-solid state. Some of these bits escape in the form of gas as the weld congeals, leaving what is termed pin holes. The pin hole is a means of exit for a bit of gas-forming impurity.

No matter how well a cylinder bore is cleaned, part of the grease remains to fry out and run to the lowest level when the job is heated. Therefore, it is well to brush the bore after it has heated, as well as cleaning it before.

After cleaning, the next problem is the preheating. Having learned by experience that an automobile cylinder of any shape needs heating previous to applying the weld, we arranged to heat this job all over.

This was done in order that all of the metal in it would be expanded when the expanded filler was added. Thus both metals would contract when the job cooled. There would be no tendency on the part of the weld to contract separately and pull away from the surrounding cylinder metal, as would be the case if the job were welded without preheating.

The location of the weld in the very heart of the casting precluded any chance of localizing the heat—that is, the preheating could not be safely confined to any certain part of the casting. The irregular, complex shape of the job made it necessary to heat the whole thing.

This was done on a special preheating table with natural gas as the heating element. This table had a battery of gas burn-

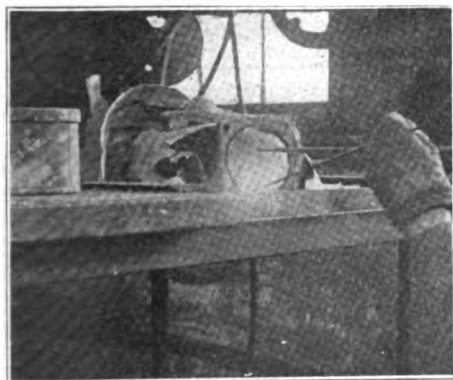


Fig. 1—Position of Cylinder in the Preheater While Filling the Score.

place is filled with the same metal as the cylinder—as it is when welded with an oxy-acetylene torch—there is no difference in melting points, and, therefore, no variation in expansion.

While most of the solders are said to

ers arranged so one or more could be lighted at one time. The cylinder was placed over these burners so the flame would envelope the whole casting, Fig. 1. The casting was placed with the open end upward during this part of the process. Pieces of asbestos paper were draped around it to conserve and confine the gas heat.

When the cylinder was fairly hot all over, and the heat well distributed throughout the whole of it, the casting was lowered upon the heater until it rested upon one side with the score downward and approximately level. In this position it was permitted to finish the preheating. The weld was made with the cylinder in this position, too.

If the score is nearly level horizontally, the weld is more easily applied because the molten metal does not tend to overflow or clog the weld. The level-flowing metal is more easily controlled and accurately placed, which is very essential in score welding.

In this class of welding, just enough filler must be added in just the right place. The weld should be confined to as narrow a strip as possible to prevent distorting action. Where a wide swath is molten or heated to near the melting stage, there is a tendency on the part of the surrounding metal to sag or to draw out of shape. The less of the surrounding bore that is overheated, the less will be the chance of warping the bore out of round.

After the cylinder was placed upon one side, it was again covered with the asbestos paper and allowed to remain under this covering until dull red all over. Some operators heat the cylinders bright red; others weld when the casting is very hot, but not at all red in daylight. The writer believes, however, that a dull red is the safest, especially for beginners. While this condition was being attained, the welder fitted a special tip to the torch, and prepared for the welding operation.

The special tip used is shown in Fig. 2. Its long, simple design makes it convenient for welding in the back end of the cylinder, although it is not fit for much else. A tip of this style can be made in any shop, if a similar kind of welding torch is used.

When the cylinder had attained the red stage of heat, the welding flame was lighted and adjusted to the standard, neutral condition. This was not only at the start, but was very carefully maintained throughout the entire filling process, so as not to take any chance of hardening the weld or causing imperfections in the filled portion.

A flame carrying an excess of either flame element is liable to produce a weld that will show up spotted when the bore is machined. A very slight excess of acetylene might cause a weld to have hard spots, while an excess of oxygen might cause pin holes or brittle porous spots. The acetylene causes carbonizing, or an injection of carbon into the melting weld.

The oxygen causes oxidizing or brittle

sponginess—the metal is partially turned to oxide, or burned to a non-metallic substance. These bits of slag get caught in the congealing metal and form porous spots and pin holes.

The neutral flame was applied to the inner end of the score first. This score formed that shallow, V-shaped groove which is usually cut in a crack to be welded. The tip of the flame played back and forth in short arcs across about half an inch of the groove. This flame, although quite large when compared to the same size used on most welds, was a mild one. The mildness was attained by screwing the regulator down a little below the usual pressure. In other words, when using a No. 3 tip, the regulator should be set to supply pressure at three pounds; other tips in proportion.

In this work, a two-pound pressure was used with the No. 3 tip size. This furnished a flame that did not blow as hard, but was still slower in melting action.

When the first inch of the groove started to brighten, the filler rod was brought closer until both melted together. Then, as the molten filler was deposited, the flame and rod were gradually worked toward the open end of the cylinder, depositing a thin stream of filler in the melting groove.

The flame played over the molten filler to settle it into the molten groove by the pressure. While this was done, the filler rod was withdrawn and dipped into a pot of flux powder. With each dip, a quantity of the flux was carried to the weld.

A liberal supply of flux was deposited during the entire welding. This flux was for the purpose of protecting the melting metal and to make it knit better—that is to make it more fluid. As soon as it was applied to the heated weld, the flux would melt and spread out over the metal to prevent oxidization.

The operator endeavored to melt each section of the weld hot and fluid as the metal in this condition is cleaner. The fluid metal permits the gas formed by burning impurities to escape freely. When

and close the hole after the bubble escapes.

However, if the weld metal is too sluggish, the bit of dross will ignite and blow out in the form of gas, leaving a tiny hole or pipe which can not close because the metal congeals before it can flow together. In other words a pin hole is formed because the metal is not fluid enough to close the hole after the gas blows out.

Another theory advanced in explanation of hidden pin holes, or those which do not show on the surface of the weld is this: the bit of slag is trapped in the weld and ignites, but the gas thus formed is not powerful enough to force its way to the surface because the molten metal is too sluggish—that is, it congeals too rapidly to permit the gas to escape. A tiny gas pocket is formed beneath the surface of the weld.

This explanation seems to account for bits of slag or dirt that are sometimes found in the weld when it is machined. The metal has not been melted fluid enough to permit the impurities to float to the surface; they are trapped in the sluggish metal to form cindery or spongy spots.

In conformity with these ideas, then, the welder should endeavor to make the weld as clean as possible in relation to the flame and filler and their manipulation. Get the weld metal hot enough for impurities to escape, but use moderation in this or it will cause new impurities to form.

If the operator attempts to force the welding by holding the flame too close, or if he allows the flame to become an excess flame, he is liable to cause the very defects he wishes to avoid. It is difficult to tell just how to do it other than to say the weld should be made rapidly and continuously, with a soaking heat instead of a forcing heat.

Reverting once more to the welding of this particular score. After the first half-inch or so of the groove was filled, the flame and filler rod were gradually worked outward, melting a new section and filling it with the rod metal. The flame was manip-

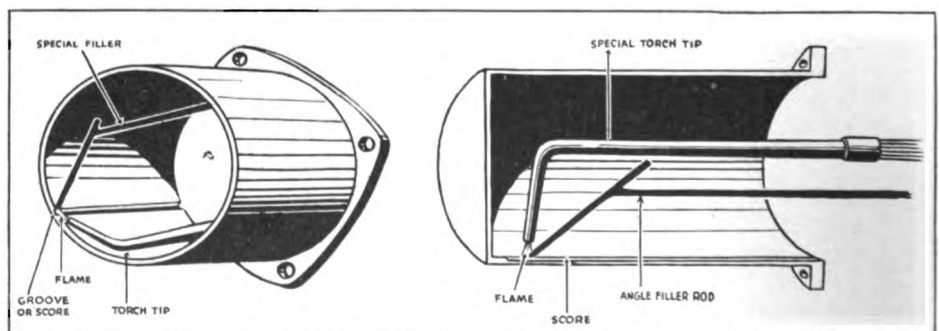


Fig. 3—Cross Section Cylinder Looking Toward Operator—Side View Showing Position of Rod and Flame.

this gas is ejected from this metal, it is still fluid enough to flow together and close up the tiny hole caused by the escaping gas—just as a bubble arises to the surface of water, and does not leave a hole because the water is fluid enough to flow together

ulated to have the filler molten and ready to deposit when the groove was ready to receive it. Thus the entire score was filled in a series of carefully joined sections.

On account of lack of working space the
(Concluded on page 34.)

Glimpses in the Garageman's World

Keeps Old Tires in Useful Service—Tow-Car Which Carries Dollies for Bringing in Disabled Cars Regardless of Condition—Traveling Garage Repair Service Provided for Ranchmen—Uses Photograph of Shop Front as Advertisement

Tow Cars of San Francisco Company.

The Atlas Taxicab & Automobile Service Co. of San Francisco maintains a fleet of towing cars by means of which a car, with all four wheels wrecked, may be quickly towed in without the necessity of having a man at the wheel of the wrecked car.

Two dollies are carried on each car, one at the side on a special bracket. It is securely clamped on so that the tow car may travel at a high rate of speed without the dolly bouncing off. The second dolly is carried on a special platform at the rear of the tow car, and held firmly by tripod and clamp. An extension tongue for the dolly is carried alongside the car.

The first mentioned dolly carries the rear of an automobile when all four wheels are wrecked, while the dolly on the rear of the car carries the front axle of the wrecked car. The extension tongue is adapted to reach forward to the front dolly and to be rigidly attached to it. This equipment can carry a totally wrecked car without the necessity of having a driver at the wheel of the wrecked car.

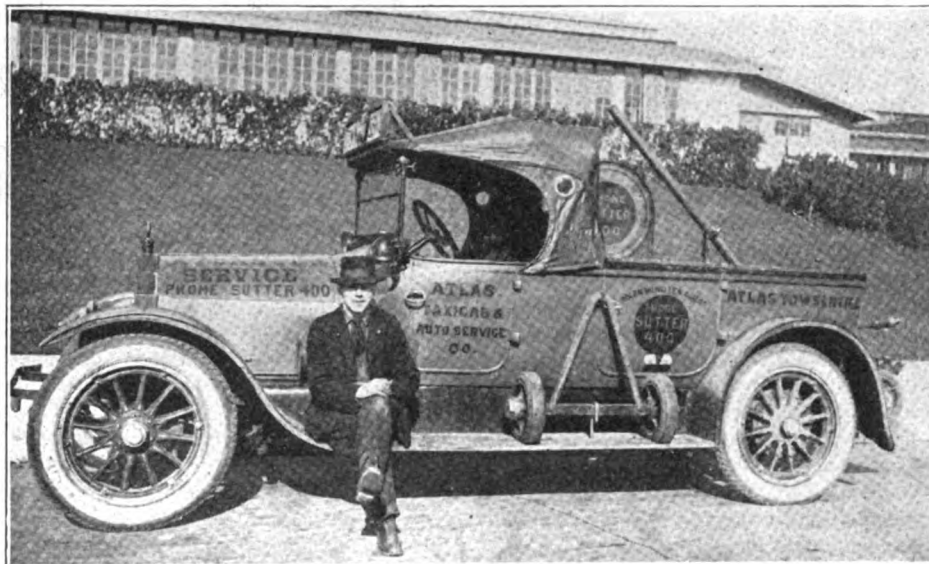
The tow car itself is specially designed and has an unusual appearance, compelling a great deal of attention when driven through the streets of San Francisco.

Advertising the Tire Business.

"A good tire speaks for itself," says Cryderman, the tire man, at San Pedro, Calif.

Mr. Cryderman has hit upon a novel plan for advertising his tire business. He erects signs at the crossroads and makes them attractive by using real tires for the main feature of the advertisement.

When a tire of the make he handles



Interesting Method of Carrying Equipment for Towing Disabled Cars.

becomes badly worn and is discarded so far as transportation is concerned, Cryderman drives a two by four deep into the ground at a curve in the road, or at a country crossroad. Then he cuts a hole 2 ins. by 4 ins. in the tread of the tire, slips it down over the top of the two by four, and drives a spike through the top of the tire, into the two by four, to hold it firmly in place.

Then he paints upon the tire: "Cryderman for Tires."

Takes Shop to Ranchers.

Fred E. Smith has found another way to increase his service, his list of patrons and his volume of business through garage service. He takes his "Shop on Wheels"

to the ranchers in the section of California in which he is located, near Saticoy.

"I do not travel around much," said Mr. Smith. "My working radius is within ten miles of Saticoy. While I have not been advertising, my work comes to me mostly through the boosting efforts of those for whom I have done work in the past."

His motto is:

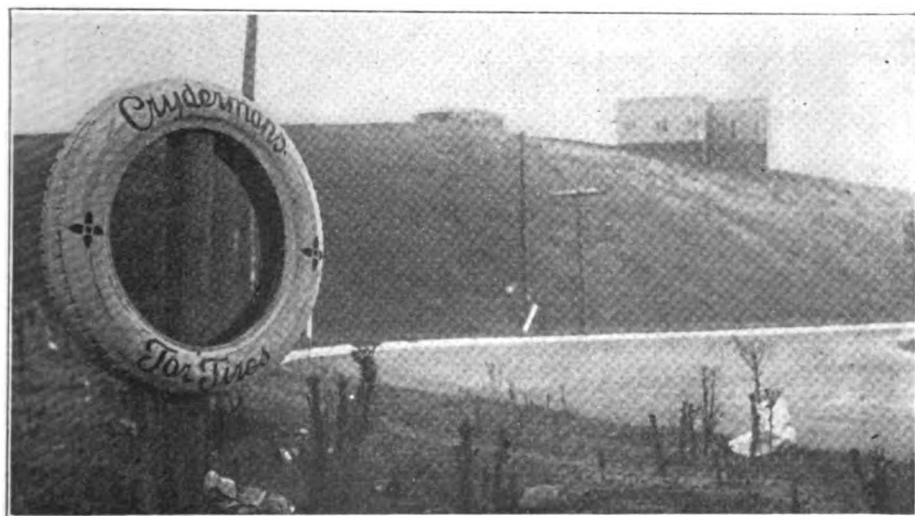
"STOP YOUR CUSSIN', LET US FIX IT."

He does welding, brazing, cylinder grinding, bronze bearings work and babbitt bearings work; also rebuilding of tractors, gas engines and pumping machinery.

His advantage over an exclusively permanent stand is that he does not have to sit about waiting for work to come in. He can pick up and leave for a route where there is almost certain to be a number of jobs to keep his "plant" busy.

In this work he claims to eliminate some expense by doing the job on the ranch. Then, too, there is the satisfaction advantage, for when the rancher stands by and watches the job as it is done, he learns what he is paying for and pays gladly.

Mr. Smith's gray truck is his shop, and a complete and neat one at that, with the slogan painted along each side of the top. To get at the machinery he simply raises lids here and there at sides and end, and the lathes and other equipment are open for work. At the sides a lid lets down to rest upon two legs and serves as a bench. He is advertising all the time while he travels.



A Novel Tire Advertisement at a Curve in the Road Near San Pedro, Calif.

Sign Says "Automobile."

The Dunham Automobile Agency on West Seventh street, Los Angeles, Calif., has a sign on top of its building that is seen for many blocks up and down the street—and, as far as it can be seen, it carries a message in keeping with the business.

The sign is made of a car mounted on an electric-lighted signboard. Instead of the regular rubber tires, there are wooden tires, each lighted with electric lights. Thus, at night, the wheels present a very striking effect.

Photograph of Front of Building Fitted Into Advertisement.

"Drive in" invites the inscription above the door of the most progressive battery service station in Oak Park, Ill., and, in fact, everything about this service station is a skillfully planned invitation to the passing motorist.

A very effective display window attracts attention to battery needs which can be supplied, and above the window is the slogan: "Service that you'll like at a price you can afford to pay."

The front of the building is narrow and the white lettering of the sign is so proportioned that it is most effective, as may be seen from the accompanying illustration.

The photograph of the building front



Automobile Electric Sign Carries a Message Many Blocks Up and Down the Street.

was cleverly used in connection with a full page advertisement in the local weekly newspaper. Directly beneath the photograph and of the same width was this wording:

"Form the habit of 'Driving In' to this place regularly to have your battery tested and inspected. Regardless of the make of battery, there is no charge."

Beneath this paragraph was the word "Location" and then the street and number with information as to the cross streets. Look at the photograph and observe how

it rounds out and supplements the reading matter of the advertisement.

Reprints of the advertisement were made and distributed where they would do the most good—in cars standing along the street curbs.

Manufacturers Investigate Causes of Short Life of Tires.

Tire manufacturers have compiled some very interesting figures regarding tires which have become unserviceable prematurely. One manufacturer states the loss of tires, ruined through carelessness on the part of owners before they become worn out, amounts to \$100,000,000 annually, which loss could almost be entirely eliminated.

Another manufacturer says that one out of every three tires used is on a wheel out of alignment, or one that is wobbly, causing the tread to wear down quickly, due to unnatural causes. Still another states that of tires which do not give complete satisfaction, 90 per cent of the trouble is due to the fact that the owners do not carry sufficient air pressure and do not have small cuts repaired in time.

Sunlight, heat, rain and cold are elements destructive to the life of rubber—not so much while in service, but that extra tire hanging on the rack will suffer if not properly covered. The rubber will crack.

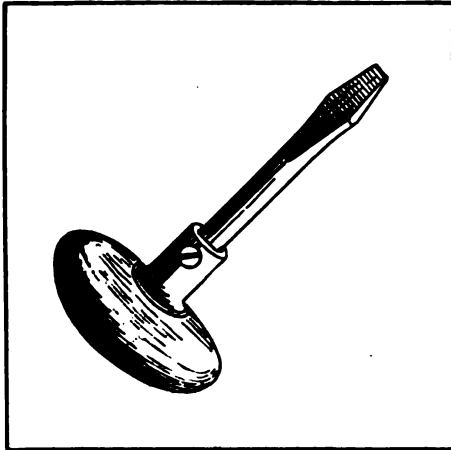


The Signs and Slogan on This Battery Service Station Front Were Cleverly Tied With the Reading Matter of Newspaper Advertisement.

Practical Hints for Shop Mechanics

Handy Screw Driver.

The screw driver shown in the accompanying sketch can be made from an old door knob and a screw driver bit. Or a screw driver can be cut from a square



Door Knob Makes Handle for Screwdriver.

shank screw driver and filed to fit in the door knob.—P. B., Pa.

* * *

Attaching Frame Bolts.

It is difficult to get bolts that run through the frame channels, back in place after they have been removed.

The simplest way to replace them, if they have been drilled to take a cotter pin, is to run a piece of wire through the frame hole and then out through the hole in the bolt. The bolt may then be drawn through the hole.—V. P., Ia.

* * *

Cause of Foul Spark-Plugs.

The cause of foul spark-plugs is often found to be because the firing points of the plug do not go into the firing-chamber.

The points which are in the firing-chamber keep themselves burned clean. Points that stay up in the threaded spark-plug hole get the carbon baked on the bottom of the porcelain, which causes a short.—C. S.

* * *

Good Use for Old Reflector.

By cutting a hole in the center of an old headlight reflector, large enough to insert a lamp socket, these two parts soldered together make a splendid lamp for reading and working purposes, as it keeps the light from your eyes and throws a brilliant light where needed.—C. J. S., S. Dak.

* * *

Making Gaskets.

The following method of making gaskets applies alike to round, oval and odd-shaped gaskets:

Select a good piece of heavy brown wrapping paper or special gasket paper without too many wrinkles, and free from cracks or flaws. Clamp the part for which the

gasket is to be made in a vise, or, if a block or anything heavy enough, lay it on the floor and lay the paper over it.

Then go around the edges of the part, tapping lightly on the paper with the flat face of a hammer, holding the paper in position. If the hammer is held at a sharp angle with the edge of the part for which the gasket is being cut, each blow will cut through or partly through.

I have seen men put a cylinder block on the paper and try to mark it. This way the outside and round inside may be made to fit perfectly. The hole may be cut the same way by a small ball peen hammer, using the ball end.—E. S., Ia.

* * *

Holding Brake Bands on a Ford.

We are readers of your paper, and must say that we profit by reading it. The shop hints are interesting. Here is one that may help someone:

Rubber bands, about $\frac{1}{4}$ inch wide, cut from an old inner tube, are the best things I know of for holding the brake bands in place on the Ford while putting on the transmission cover.

When the cover is in place, the bands can be pulled out easily, even without breaking them. It is much quicker than tying them together with wire, which sometimes breaks and causes trouble if not taken out.—W. H. B., Idaho.

* * *

Will Clean Dirty Parts Quickly.

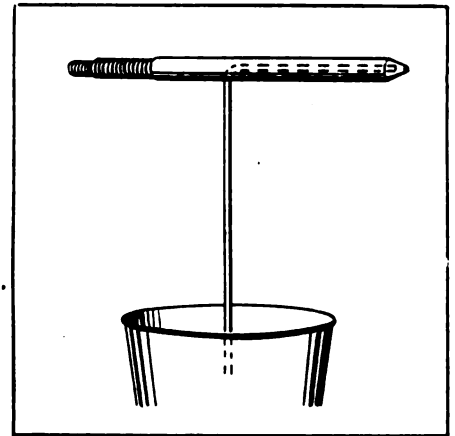
For the rapid cleaning of greasy dirty parts, I have an appliance like that shown in the illustration. The main pipe is of $\frac{3}{8}$ -inch flexible copper tubing with a tire valve soldered in one end and the other peened down to form a nozzle.

I cut or filed a hole in the large tube and inserted the end of an 18-inch length of $\frac{1}{8}$ or $\frac{3}{16}$ -inch tubing pointed toward the nozzle end and lacking $\frac{1}{16}$ -inch of being flush with the nozzle.

The hole where the small tube is in-

serted is then soldered tight around the small tube and it is bent at right angles to the large tube. The small tube may be placed in a can, bucket or any vessel holding gasoline or coal oil.

Put the air chuck on the valve stem and



Easily Constructed—Removes Dirt Quickly.

you will be surprised at the force of the fine spray of gasoline.—D. & F., Mo.

* * *

To Stop Balky Starter.

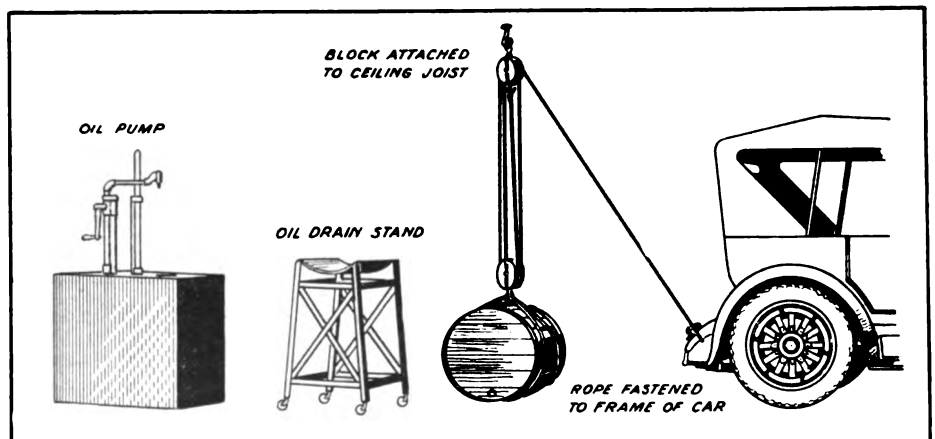
A Bendix drive on a starter will sometimes stick and cause the driver to think he has run low on oil. This will happen just as you step on the starter button. It is impossible to start the car or use the starter.

It can be loosened by putting car in high gear and rocking it back and forward three or four times.—W. H. C., Nebr.

* * *

Handling Oil Barrels.

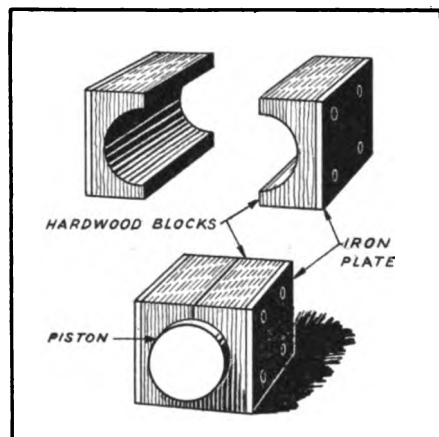
A convenient arrangement to handle full oil barrels, to drain into the pump supply can be provided by the use of an automobile and block and tackle. Power is furnished by the automobile, as shown in the accompanying illustration, to quickly raise the barrel to the rack.



Block-and-tackle Arrangement for Handling Full Oil Barrels.

Wooden Block for Holding Pistons.

Often when working on a piston it is necessary to hold it in a rigid position. A simple arrangement which can be used for this purpose and will not injure the



Holds Pistons in Rigid Position.

piston in any way is shown in the accompanying illustration.

Such a piston holder can be made of any old pieces of hardwood, preferably, however, of a solid piece, bored out in a lathe or on a drill press and then cut in half. It can be made more substantial by fastening iron plates to the sides which come in contact with the jaws of the vise. This will prevent the vise jaws from crushing the wood and shortening its life.—L. M. W., Pa.

* * *

Bushing Ford Steering Arms.

Ford steering arm tie-rods often make much fuss and rattle because the ends work up and down on the steering arm bolts. When ready to rebush the steering arms, try using old bushings which have been removed from the spindle body. The large head on them takes up the play.

Press in the steering arms and then ream. This makes a more lasting job than the regular steering arm bushing.—R. W. T., Mo.

* * *

Cleaning the Oiling System.

The oiling system on a Dodge car can be thoroughly cleaned and washed by using an extra cap that covers the Ball check valve on the oil line, drilling a hole the same size as a valve stem of an inner tube, and sweating the valve stem into the cap.

By screwing the cap back on the check valve, air pressure can be applied by a hand-pump or free air hose. This system will clean all the oil holes in the oil line and insure perfect action.—H. S. B., Fla.

* * *

Home-Made Air Compressor.

We were in need of an air compressor, so we picked up an old second-hand one-cylinder Excelsior motorcycle engine which is air-cooled.

We ground in the exhaust valve and removed all gears and cams. We also made an automatic intake out of the original intake valve with a delicate coiled spring to

close the valve as soon as the suction stroke was over.

The air was admitted through the original intake port and exhausted through the spark-plug hole. By welding $\frac{3}{8}$ -inch pipe to the spark-plug after breaking out the porcelain, we were enabled to connect to the tank.

So far this has proved entirely satisfactory and the cost for the compressor, plus the spare time making it over, has not been one-fourth of the cost of a new one.—H. S. B., Fla.

* * *

To Remove Cotter Pin.

My remedy is to take an end wrench and you can cut the key off easily and quickly. Have the nut off while you are trying to straighten the key.—G. K. M., Omega, Ga.

* * *

Old Piston Rings in Welding.

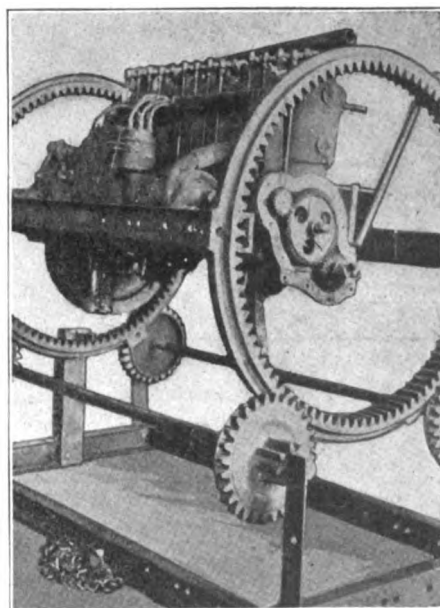
A few days ago, while welding on a cast-iron job, we ran out of filler rod, so we used old piston rings by welding them to the end of a short cast filler rod. They worked fine and had the advantage of being crooked to get into unhandy places.—H. S. B., Fla.

* * *

Novel Automobile Engine Rack.

Some automobile mechanic is always devising some kind of apparatus for facilitating his work and lightening his labors. The photograph shows a new arrangement for handling motors which does away with lots of grief in making repairs and adjustments on cylinders, valves, connecting rods, timing gears, etc.

With this machine the engine may be



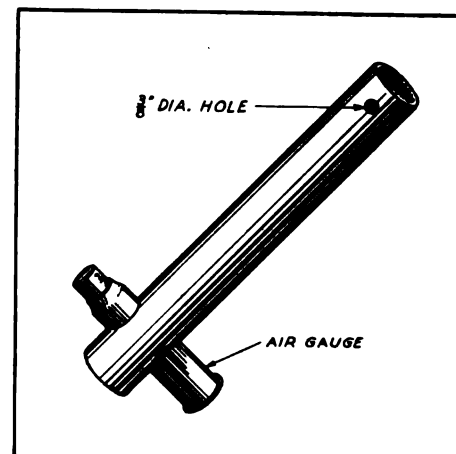
Rack Which Easily Handles Engines.

quickly and easily placed in any position without the usual exertion. This device may be easily constructed in any garage repair shop at but trifling expense by obtaining the gears and steel parts shown in the photograph.—D. B., Kans.

Handy Air Gage Attachment.

To prevent people from carrying away our air gage, I use this scheme:

Take a piece of pipe or angle iron, ten inches long; drill a hole the size of the air



Air Gage Which Is Not Carried Off.

gage about two or three inches from one end, insert the air gage and solder it to the pipe so it will be rigid. A hole in the pipe permits hanging it on a convenient nail. I find this a very good idea to save air gages.—W. J. M., Fla.

* * *

Run Shop Engine on Kerosene.

Many gasoline engines used in the shop may be slightly changed so as to run satisfactorily on kerosene.

First remove one of the cylinder-head studs and arrange a small bracket to hold a sight-feed lubricator. Then fasten on with the cylinder-head stud. Mount the oiler on the bracket and fill with gasoline, and run a copper tube to the carburetor or mixer. Fill the regular tank with kerosene. Leave the kerosene shut off and start on the gasoline; then gradually open the kerosene valve and turn off the gasoline.

If a hot-air stove and tube can be fitted to the exhaust pipe and so arranged as to convey hot air to the mixer, better results will be obtained.

Quite a saving can be made by operating on the cheaper fuel.—T. W. R., Mo.

* * *

Easy Way to Get Car to Shop.

I have been called out on the road to repair a wheel where all of the balls were ground out, and, not having the necessary parts to repair it with, I used this method to get the car to the shop without injuring the spindle. This is only applicable for the cup and cone style.

Drive the ball race out of the wheel hub, turn the hub cups around, and drive back in the hub. Put your cones on the spindle, adjust the lock cone, and you can drive 25 miles without any danger of damaging the spindle. This trick will work with either the inner or outer balls. Use plenty of grease.

Drive the ball cup in backwards.—G. H. M., Ga.

Readers' Questions and Answers

Load too Heavy for Chassis.

We have a model 83-B Overland truck that keeps cutting off the double keys that couple the main drive-shaft to the transmission.

I have replaced the collar, also the shaft, and this does not seem to benefit it. The collar and shaft are both a tight fit but after a few days' use will cut off and work ahead.

I also have an Oldsmobile model 54 that generates too much. How can it be lowered, since the Delco system on that model has no third brush?—K. M. Co., Pa.

We are of the opinion that the model 83-B Overland that you speak of was built from a touring car, and the work you are doing with the truck is somewhat heavy for this type chassis. However, you may have the keyways machined a trifle larger and keys made to fit. If you will use a good grade of steel for keys, this may be a more durable job.

Most of the generators of the type used on the Oldsmobile model 54 have been rebuilt, being the large, single-coil system. Before being rebuilt, this system used the mercury tube type voltage regulator. In these rebuilt motor generators, the reverse series winding gives sufficient regulation to make the mercury tube regulator unnecessary; hence on the rebuilt system, no mercury tube is required.

We believe your trouble is located in the winding of the field coils, perhaps it is short circuited. If this is the cause, it should be repaired or replaced with a new coil.

The regulation of the generator is controlled by the reverse series winding of the field coil in this type of generator.

* * *

Care of Ignition Battery.

Will you tell me through your Readers' Questions and Answers how to care for an automobile ignition battery and the recharging?—R. E. D., Ky.

Not many years ago almost every lead storage battery had a five-year guarantee. This has since been reduced in some cases to about six months and in others to not over three months. The reason for this reduction has been that batteries of all makes have been more or less abused by not being properly charged according to directions, by being improperly discharged, by not having enough water over the plates, and by careless breakage of terminals and jars.

By properly caring for a lead battery, it should be possible to get five years' use out of any good make, even in these days of brief guarantees. Most users try to get more energy out of a battery than they put into it.

A certain man brought his battery in for attention but, as it was ruined, it could

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

not be charged. On examination, it was found that it contained very little water, the plates were sulphated, the voltage reading was down around 1.4 instead of 1.8, and one terminal binding post was loose. He had discharged it too low and also had forgotten to water it for a number of days.

This battery had to be taken apart, the plates scraped clean of sulphate, new solution put in, and a long charge given, all because of abuse and neglect.

It is possible to revive an old battery of good make having good plates and no leaks, by simply cleaning it out, then refilling with electrolyte of proper density and putting it on charge at its normal rate for eight hours. Then, instead of cutting off the charge entirely it should be reduced to one-half the rate and continued on charge for five or six hours longer.

During both the charges, care should be taken that the voltmeter reading per cell does not go over 2.5 volts. If time permits, the charge may be reduced again and extended a few hours. The battery will then have been charged to its limit. The specific gravity should be read, and if not up to say 1.275, some cooled-off electrolyte should be added. Some of the old liquid may have to be drawn off, if the jar is already full.

All sediment from the bottom of the battery should be thoroughly and carefully removed before the charge begins, to avoid short-circuiting the plates at their lower extremities. This is a necessary and important precaution and should not be overlooked.

After the battery is fully charged and

properly attended to inside, the outside should be cleaned, especially taking care to remove any sulphate from the terminal binding-posts. A good coating of thin asphaltum paint or dynamo varnish will help keep all parts in good condition.

Many batteries are given too short a charge; and hence are often brought back for a renewal before a reasonable time. Sometimes after constant use, new plates will be needed, especially the positive, which may be secured for any type of lead battery.

Care should be taken not to put any foreign material into a lead battery, such as a nail, copper wire, or mercury from a broken thermometer. Water from a well, stream or city service, or any other water which is liable to contain iron, salt, lime, etc., should never be used. Use only distilled water. Commercially pure sulphuric acid should be obtained and not that made from iron pyrites.

While on charge the voltage may safely rise to 2.5 volts per cell or 7.5 volts for a three-cell battery. When cut off from the line, the reading will immediately drop to 2.2 volts per cell, or 6.6 at the terminals, if the gravity is high enough.

A run-down battery of three cells should show a voltage of not below 5.4. Any less than this may start sulphation. When the battery shows 6.6 volts disconnected from the line and a specific gravity of about 1.275 to 1.300, it may be considered as fully charged and in ready condition.

* * *

Correction for Bucking.

We have a Dodge car for demonstrating, 1919 model, which is giving us a lot of trouble by bucking when running at low speed. It runs fairly well with the choke out full when it is cold, and when it is warm it will not run well with the choke anywhere.

I took the carbureter apart and cleaned it, tested the gas line, readjusted the carbureter, cleaned the points, tested the time, and tried new plugs, but the trouble is as bad as ever; also inspected the valves. Please answer these questions as soon as possible as we are held up on the job.—J. C. E., Pa.

Your trouble may be attributed to one of the following causes:

Uneven compression in the four cylinders, leaky intake manifold, or poor gaskets between cylinders and manifold, or carbureter and manifold. Dirt may accumulate in some of the jets in the carbureter, through which the gas must pass. Also, some of the brushes in the magneto may not be working freely.

We suggest that you secure a compression gage and test the compression of the cylinders, turning the motor over by hand.

Examine the gaskets between the intake manifold and the motor for air leaks; also the gasket between the carbureter and

manifold and the manifold proper. Any air reaching the mixture at these points leans the mixture and will manifest trouble by causing misfiring in one or more cylinders or appearing as a lean mixture.

Perhaps it would be advisable to examine the jets in the carburetor for any obstructions or accumulations of dirt.

We feel confident that you will locate the trouble in one of the above-mentioned sources.

* * *

Cleaning Parts.

We are seeking a way to clean and wash the differential, transmission and universal joint.

From some avenue we have learned that steam is sometimes used for this purpose, but an experiment with it filled the garage full of steam in cool weather.

We have always felt as though the greasy, waxy grime should be cleaned out of these parts. We have an air equipment and coal oil gun. We do not find that these are entirely satisfactory.

We want to use some scheme in connection with a greasing station, which we propose to install, to properly lubricate cars, springs, and the like.—H. I. & M. Co., Kans.

We know of no device that could be used successfully on all of the several different designs of transmissions, differentials and universal joints on the different cars with which you no doubt will come in contact, that will do as thorough a job as you refer to in cleaning the old oil and grease from the compartments before putting in clean grease or oil.

At best, this is a slow tedious job. You

will find several cars on the differentials of which no drain is provided. Perhaps the only practical way to do the cleaning would be dismantling. Others you will find with drains or removable covers. Some you will find with gear oil that may flow freely, or quickly diluted with the air pressure and coal oil gun you speak of, will rapidly drain off.

Some you may find filled with heavier oil or even hard-cup grease which would be difficult to remove even with the ordinary drain provided. As it is not as susceptible to the coal oil, considerable time would be expended in reducing the grease to a consistency where it would flow out freely.

You will find a wide range of lubricants used in gear cases of the several cars with which you will come in contact and a device that will work well on one car will often work out unfavorably on another.

* * *

Starter Troubles.

I have a Buick car with the Delco starter and generator combined, and cannot get it to charge properly. It just charges up to a few amperes and then when speeded up, goes back to zero. Now I think it is because of changed polarity. Kindly tell me how this condition is caused and the remedy for it.—A. E. S., Nev.

From your description of the starter, the trouble may be due to one of the following causes:

Poor contact at the brushes. This in turn may be due to a dirty commutator, ragged brushes, or insufficient tension on the brushes. A rough commutator, when

the motor is speeded up, may also prevent good contact, even though when the generator is at rest the contact may seem perfect.

We suggest that you have the commutator cleaned, and if necessary, or if the generator has done considerable service, remove the armature and turn down the commutator to a finished surface after which it would be advisable to fit new brushes.

* * *

Tinned Iron Bolts for Batteries.

What is the best kind of acid or pickle to use on iron bolts before dipping them to lead coat them for storage battery purposes? I do not wish to install the electric method, but merely to dip them in molten lead.—A. K. J., Kans.

Battery manufacturers do not recommend the use of an iron bolt coated with lead for storage battery purposes. They recommend the use of copper or brass bolts, lead tinned.

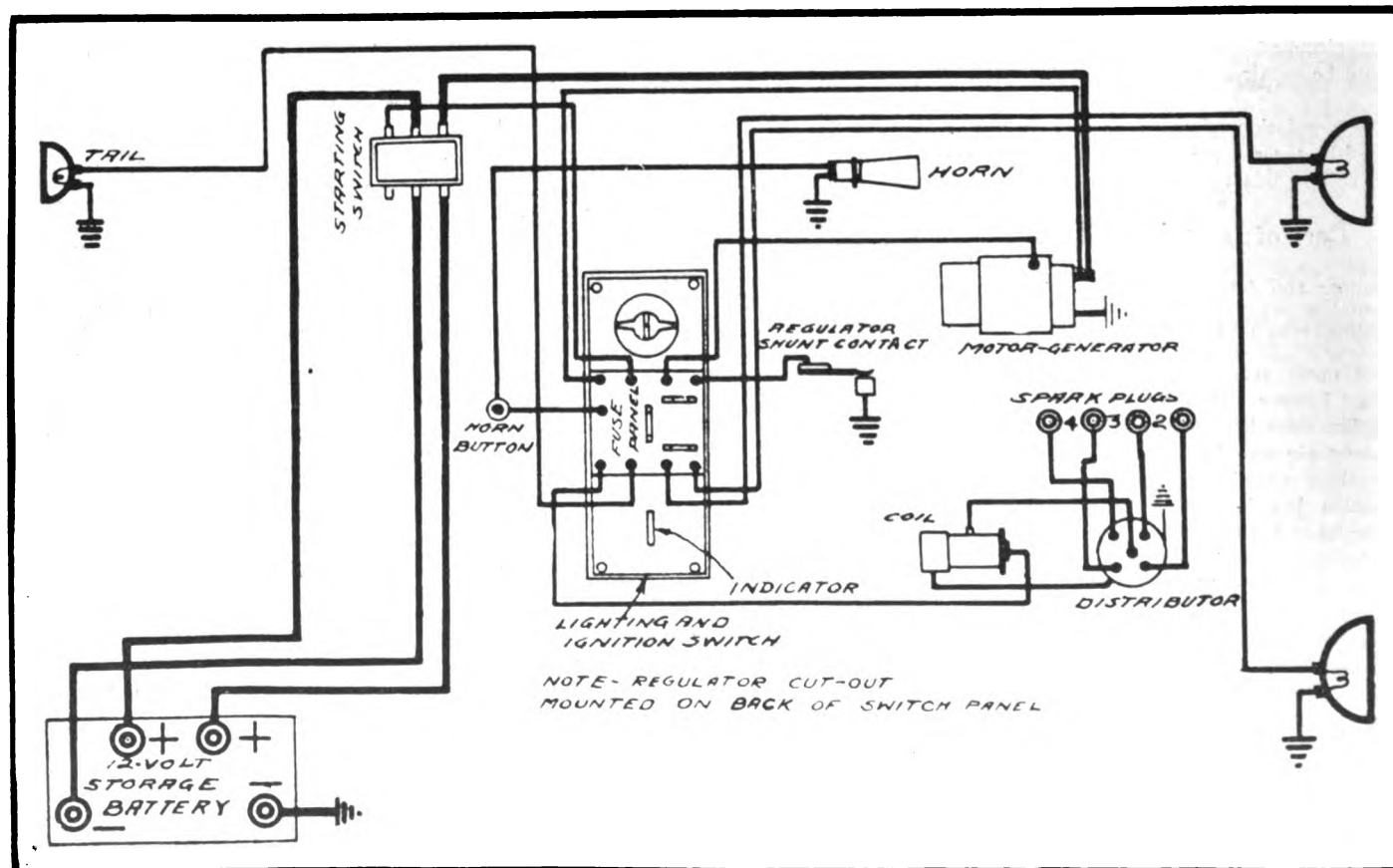
We would suggest that you obtain bolts for the storage battery from a battery manufacturer, and then there would be no possibility of ruining the battery through the improper coating of the bolts.

* * *

Wiring Diagram for Maxwell.

I have been wanting to see a wiring diagram for the model 1917 Maxwell for some time. I wonder if you would publish it in your magazine when you have an opportunity. If so, I shall appreciate it.—R. L. V., Tex.

The wiring diagram for which you ask is shown on this page.



Wiring Diagram for Model 1917 Maxwell Car.



THE VULCAN NAMEPLATE

On every VULCAN is our nameplate. It is placed there because we are proud of what the spring will do for the man who buys it.

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put on

VULCAN
The Replacement Spring

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 25.)

manipulation of flame and filler was a matter requiring considerable dexterity. Sometimes the flame worked side by side with the rod and sometimes it followed the rod, all owing to the condition of the molten metal. When the groove melted too rapidly for the filler, the flame was played more upon the rod; the reverse when the filler supply became too great.

A special rod, which most welders will find more convenient than a common straight filler, was constructed for the job. As illustrated in Fig. 3, the special rod was constructed by welding a short piece of filler to the end of a longer piece. This arrangement permitted the operator to twist the filler directly into the melting weld whenever necessary, instead of always at an angle when employing a straight rod. The special rod also allowed him to work either before or behind the flame—and as he could see the weld at all times there was less danger of poorly-connected portions in it.

When constructing special filler rods of this nature, the operator may weld the short piece on at any angle best suited to his style of welding. The short piece may be welded at right angles or at any wider angle; also a light piece may be welded to a heavier long piece, affording a sort of handle that is not so tiresome.

After this particular score was filled entirely from the inner to the outer end, the whole casting was covered with fresh sheets of asbestos to cause it to cool very slowly. This was the most particular part of the whole proceeding, aside from the actual fusing of the metals.

The job was covered so the heat would radiate slowly and would be conducted from one part of the cylinder casting to another to cool it uniformly throughout—in other words, so the surrounding casting metal would cool and contract in unison with the contraction of the weld metal. Otherwise, if the weld metal cooled last, it would pull away from the cylinder metal and form one or more cracks in the weld or metal adjoining it.

To insure an even start in both contractions, the cylinder was allowed to heat under cover for several minutes before shutting off the preheater. Then the job was left under cover until cold enough to handle.

The next step in scored cylinder work is probably outside of the welder's sphere, for it is more properly a machinist's work. Many welders, however, do not have access to a machine shop and are forced to finish the work themselves. The surplus metal of the weld must be removed and the bore ground and polished to size.

In the job discussed, the weld metal was first roughed out with a portable emery grinder. In fact the most of the surplus

PENLINGS FROM THE PEN OF DIKE.

Back again among the "contriBs" of the "American Garage & Auto Dealer"—going to stay this time for a while.

Advertise sedans and coupes as wedding presents for June brides. Lots of happy fathers are giving a handsome automobile to the bride as a wedding gift. If you don't believe this, watch your society columns during June—you will see that Dike told you right.

Tourist season is starting; fill your window with tourist needs. You may think it too early, but did you ever stop to think that early in November the large department stores filled their windows with gifts for Christmas and, as you are aware, Christmas is a one-day affair.

Put up screens around your garage, as you may have many bald-headed tourists this year. Another thing is that you can get more milk from a cow when she doesn't have to fight flies—same way, you can get more work from mechanics when they don't have to fight flies.

Every week you read in the daily newspapers about that week being some special week, such as "Red Cross week," "orange week," "fire prevention week," "bicycle week," etc. Why not make every WEEK a "Smile and Service Week" around your garage?

Clean overalls and smiling faces worn by your mechanics demonstrate to the world that you, Mr. Garageman, are a good man to work for, and folks like to trade with a man who treats his mechanics right.

Never can you sell an article to others until you have sold yourself.

1921 is a fighting year. Be in the front-line trenches, for the man who sells merchandise this year can't stay in the back lines.

The past winter has demonstrated that to get business you must use your backbone instead of your wishbone.

Resolve that this summer you will sell the customer an automobile instead of the customer selling you. Money is a little tight to keep many used cars on your floor that customers have sold you.

Mail order houses say that their business has decreased. Advertise, Mr. Garageman, and make them say that their mail-order business in your neighborhood has "deceased."

When a traveling salesman calls on you, give him your hand with a feeling that you are not just handing him out a piece of liver to hold.

If a customer talks "hard times," don't wail with him—keep smiling, and after a while watch the sunshine come in his face. Then is the time to get in your line of optimism, and first thing you know that same person who wailed, will dig down in his sock and buy, perhaps, a car or tire. Try it! It's dollars to a piece of bread with a hole in it that Dike is right.

Boost the Boy Scout movement. The boys of today are the car-buyers of tomorrow.

Attend Commercial Club meetings. If put on a committee, be a lifter, not a leaner.

**System, Advertising, and Smiles,
Makes your money grow in piles.**

weld metal was removed by grinding with a fine grained wheel. The work was slowly and carefully done with frequent pauses to measure the results.

The last layer was removed by what is termed "lapping." This was accomplished with a lapping tool made of an old piston. The tool was coated with grinding compound and revolved until the bore of the cylinder was the right size.

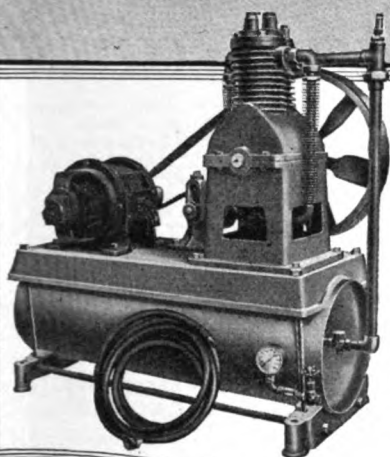
Complete Motorization of Farms to Overcome Loss of Man-Power.

"Farms throughout America must be motorized to offset the deflection of 33 per cent of the men from the farms who have taken up their residences in the large cities, according to the recent reports pub-

lished," says H. F. Harris, president of the Bethlehem Motors Corp.

"These reports also show that the number of abandoned farms is increasing. By motorizing completely, the farmers will do much to overcome the loss of manpower, and will greatly simplify their work.

In one case, a horse has not put his foot upon a farm of 160 acres during the last three years. Yet this farmer out in the Middle West has been very successful. Through ridding himself of his horses he has opened many acres for cultivation for human consumption. You must remember it is a well-known fact that it takes five acres to feed a horse, and but three acres for a human being—for one year."



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An Original Design

Curtis Two-Stage Compressors embody every good feature of single-stage plus two-stage efficiency. Have all the exclusive features that established our single-stage so firmly on the market—and in addition have all possible advantages of two-stage compression.

Aeroplane type COPPER inter-cooler with thin copper radiating fins rigidly attached, assuring most efficient cooling and fullest advantage of two-stage compression. Built in several styles in two capacities. Ask your jobber. Insist on a Curtis. Rather than accept a substitute, write us direct.

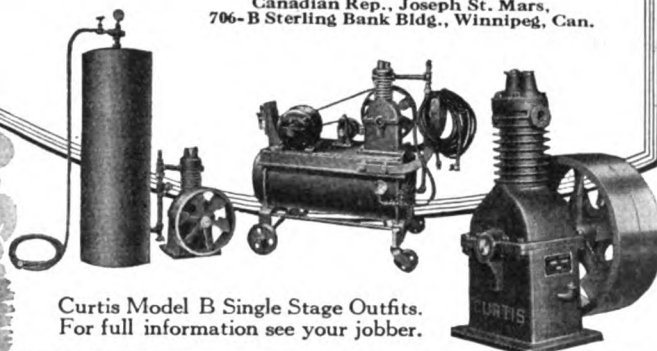
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The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have earned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

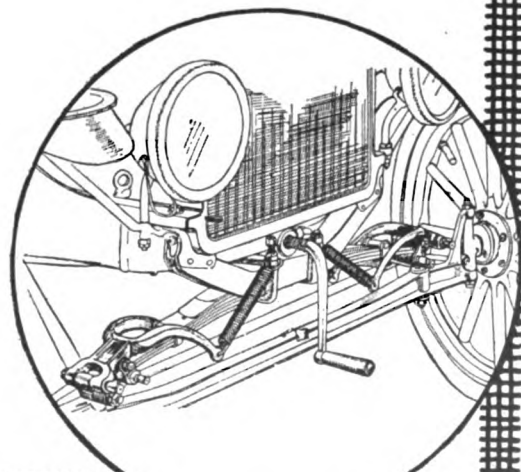
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Accessories—Dealers' Key to Profits

A New Combination Tire Iron and Jack Handle Tool.

A tool of practical usefulness, that combines a tire iron and jack handle, has been brought out by an enterprising manufacturer of automobile tools and hardware specialties. This tool is said to be of



Fits Any Automobile Jack.

great value to automobilists because of the fact that it combines two important tools in one.

The further claim is made that the handling of tires without injury is facilitated by the use of this tool. It is also highly recommended for use as a jack handle by reason of its great strength and that it fits practically any size or make of automobile jack.

The tool is small, being manufactured in 12 and 16-inch lengths, and occupies only a small space in the tool kit—no more, perhaps, than a screwdriver. It is made of forged steel. Its wide range of usefulness makes it fill a real need.

Write the Smith & Hemenway Co., Inc., Irvington, N. J., for further details, and be sure to mention the American Garage & Auto Dealer when writing.

A Piston Ring You'll Like—The Ever-Tyte.

"Where are you bound for, sir?" asked the mechanic, as he prepared to make an inspection of the big touring car.

"Home," replied the traveler emphatically.

Noting his tone, the mechanic glanced up at him. "Bad as that?" he laughed.

"I'll be lucky, if I get there, I reckon" answered the traveler disgustedly. "It's been just one thing after another the whole trip. I was bound for California, but I've had enough I'm going back. Something tells me there'll be another second-hand car on the market when I get home, too."

"What's been causing you the most trouble?" inquired the mechanic. "Seems to me you have a pretty good car."

"Ought to be a good one," complained the traveler. "It cost me enough. But, Lord, man, the first cost was a trifle to what the maintenance will be at the present rate."

"I've been using a quart of oil every 30 miles, the engine is noisy in spite of

the fact that I have had it looked over several times, the spark-plugs have to be cleaned every little while, and there have been a dozen other ailments. The last fellow who inspected the car told me I ought to have the cylinders rebored and apply new pistons, but I guess I'll just get rid of the car when I get home and try another kind."

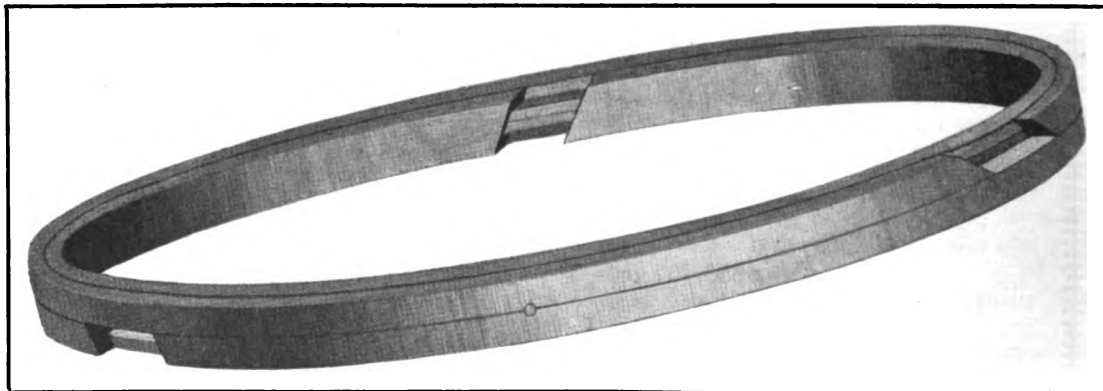
As he listened, the mechanic had been thoroughly examining the car. Turning to his gloomy customer, he said smilingly: "Well, sir, if you will pardon what may appear to be presumption on my part, I should say you've been making a 'mountain out of a molehill.' In fact, there's only one suggestion I'd like to make if I may."

"Oh certainly," sarcastically. "For a couple of hundred or so you'll make it as good as new, I suppose."

The mechanic laughed good-naturedly. "Can't make me mad," said he. "I can see you have had enough annoyance to make you sore on the world. Too bad, too, because the first man who repaired the car ought have been able to make it run like velvet for you."

"Well," sighed the customer, "I'm sold again, I suppose. Let's have the suggestion. I'll make one more try before I give up my trip if the experiment isn't too costly."

"The expense will be small," replied the obliging mechanic. "If you will let me install a set of Ever-Tyte piston rings, you will find your engine running sweetly the rest of your trip. More than that, you will save from 10 to 15 per cent on fuel, as well as gaining considerably in power. Wait a minute. I'll get one and explain its construction in detail to you."



Renew the Life of Your Customers' Cars With Ever-Tyte Rings.

"You see," returning with the ring, "It is a three-piece ring, the parts being so proportioned that all three pieces have the same strength. This construction was used for the purpose of permitting the ring to expand in a true circle for all diameters within the limits of its expansion and to

create an even radial wall pressure with resultant equal wear to the cylinder walls.

"Notice, also, this right-angle interlock, which is used with the idea of having a ring which is to all intents and purposes a one-piece ring, making the installation simple and eliminating excessive side wear on the piston ring grooves."

"The extreme flexibility of the component parts permits the rings to readily adapt themselves to cylinders which are already out-of-round."

"I'll tell you what I'll do. You expect to return this way, don't you? Just to show you how much confidence I have in the effect the Ever-Tyte rings will have on your car, I will install a set of them for you and if you do not find them satisfactory, and will stop at my place on your return trip, I'll refund your money. How's that?"

"Go ahead and put them in," answered the traveler. "Your proposition seems to be a fair one."

The rings were installed, and the traveler was on his way once more. Four months later his car stopped again in front of the shop where he had purchased the rings. The mechanic who had inspected the car on his previous visit, came out to greet him.

"Well, sir," he said, "I take it you found it smoother going after you left here in June."

"Smoother? Why, I haven't had any trouble since, except a bit of tire repair now and then. Those rings are wonderful! I've driven something like 3,000 miles since they were installed and I have had no more oil leakage, the engine has run smoothly, and I have gotten more pep and power from that car than I ever would

have believed possible. I've been getting 20 miles per gallon of gasoline, too, where before I only got 16. Those Ever-Tyte rings of yours are the one best bet I'd say."

The Ever-Tyte rings are made in all sizes—for automobiles, trucks, tractors,



STOP THE DEATH GLARE

When such accidents occur the responsibility is up to you

HED-LITE GLARE DEFLECTORS

Stop the Glare Without Dimming the Light



Made of metal, not a lens—Quickly attached—Unbreakable and Everlasting.

Lets all the light through, but deflects all the upward slanting rays down to the road, increasing the road illumination and eliminating the glare that causes accidents.

Meets every legal requirement everywhere.

Made in Three Sizes to Fit All Lamps

No. 1 for lamps using from 8 to 8¾ inch glass. No. 2 for lamps from 8¾ to 9¾ inch glass. No. 3 for lamps using 9½ to 10½ inch glass.

Price for either size.....\$3.00

Special Size for Ford Cars. Price.....\$2.00

Sold to the trade through regular channels. If your dealer cannot supply you order direct. If not entirely satisfactory return to us and we will remit the full price paid.



THE PENNYPACKER COMPANY
2206 Michigan Avenue CHICAGO, U. S. A.

motorcycles, airplanes, boats, fire engines, locomotives, compressors, pumps, ice machines and engines, operating under steam, air, gasoline, fuel oil, alcohol, distillate, gas, kerosene, etc.

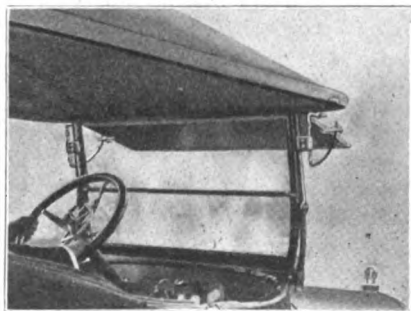
These rings are manufactured by Walter A. Zelnicker Supply Co., Ever-Tyte Piston Ring Division, 1600 Kingsland Ave. (Wells-ton), St. Louis, Mo. In writing the manufacturers, please mention the American Garage & Auto Dealer.

Storm and Glare Visor for Shielding Eyes of Motorists.

The "Presto" storm and glare visor shown in the accompanying illustration, designed to shield the eyes of motorists from the glare of the sun, street lamps and headlights, is one of the latest devices added to the wide line of articles manufactured by the Metal Specialties Mfg. Co., 338-356 N. Kedzie Ave., Chicago. It has been placed on distribution and already a heavy popular demand has been created for it.

The visor consists of a patented nickel-plated, adjustable bracket and has a thumb-screw attachment which permits its adjustment to any range or angle of vision without the driver leaving his car. When used on an ordinary touring car, the supporting brackets are held in position by two steel clamps which fasten to the windshield posts. Each bracket is provided with screw holes as when applied to closed cars the clamps are not used, the bracket being screwed securely to the frame of the windshield. A special bracket is made for Ford touring cars and roadsters.

The frame, the joints of which are electrically welded, is covered with black water-proof automobile top material firmly stitched and presents a neat and finished appearance. A wide piece of material is left at the back of the visor in order to completely seal the space between the automobile top and the visor, thus excluding rain or snow. A round piece of bar steel extends across the top on the entire width of the windshield, projecting $2\frac{1}{4}$ inches on each side. The adjustable brackets slide on this bar so that each visor is adjustable



Protect Your Eyes With This Visor.

in width to suit any car within a variation of four inches.

The Presto visor is being made in two sizes, the larger one being four inches wider than the smaller. With this adjustable feature it will fit all cars from 36 to

44 inches in windshield width, measuring from center to center of the windshield posts.

It is claimed for the device that it adds greatly to the comfort and safety of motor-ing, relieving the constant eyestrain and preventing accidents due to clouded windshields and glaring light.

For further information concerning this very useful appliance, write to the Metal Specialties Mfg. Co., 338-356 N. Kedzie Ave., Chicago. Be sure to mention the American Garage & Auto Dealer when writing.

These Windows Do More Than Let in Sunlight!

To dealers who are desirous of having their show windows distinctive, the C. A. Shaler Co., Waupun, Wis., is offering some very effective displays on request.

The illustration shows one of these display cut-outs. The life-size figure is



See the Smile? He Uses Shaler Vulcanizer. lithographed in natural colors, so that it stands out in a most striking way.

Such a display does more than attract the momentary interest of the passerby. It is almost certain to fix in his mind the name of the dealer and, aside from serving as a reminder of the reliable Shaler products, will probably bring him to that dealer's shop for many other accessories.

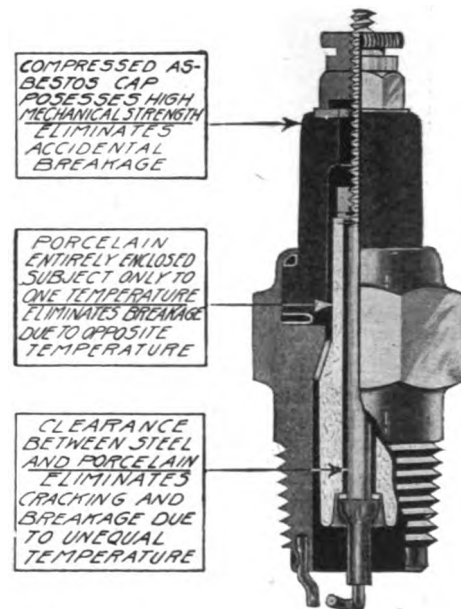
In writing to the Shaler company regarding these displays, please mention the American Garage & Auto Dealer.

A Spark-Plug for Every-Day Service—The Durabilt.

Durability is a quality one would like to be assured of in every article purchased. And there is no other article of automotive equipment in which this particular quality is more to be desired than in a spark-plug.

The manufacturer assures us that one of the outstanding features of the Dura-

bilt spark-plug is the fact that it is "Built to stand up in severest service." It is constructed with a compressed asbestos cap which possesses high mechanical strength, the porcelain is entirely enclosed and sub-



"Built to Stand Up in Severest Service."

ject to only one temperature, and there is ample clearance between steel and porcelain, all of which is said to eliminate breakage.

The Durabilt is made for all engines and for all classes of service, and is the product of the finest materials and workmanship. It is offered with the feeling that a spark-plug that will operate efficiently under the most adverse conditions and "stand up" is certain to give satisfaction to the user.

For further details, write the W. H. S. Mfg. Co., 2764 Roosevelt Ave., Indianapolis, Ind., and mention the American Garage & Auto Dealer when writing.

Complains About Oil Waste?—Sell Him an Adamson Cooler.

"It's blamed funny," says Mr. Car-Owner sometimes when he comes into the shop, "how much oil that Lizzie of mine drinks up."

Suppose you could come back at him by saying "I can give you something that would mean a saving to you of over 50 per cent in lubricating oil." Wouldn't he just grab for it? You may be sure he would.

The new Adamson oil cooler for Ford cars is a very simple, and yet a most effective device which, its manufacturer assures us, will do that very thing—save over 50 per cent in lubricating oil.

Further, it is said to collect all dirt in the oil, give better lubrication on long grades, make the engine run cooler, increase power, and prevent carbonizing, fouled spark-plugs, burned-out bearings and magneto short-circuiting. It may readily be bolted to the bottom of the engine crankcase in place of the present pressed steel inspection plate. Overheating causes oil to be so thin or fluid as to escape in consider-

RUSTSOLVO

Here is something you CAN sell *now*. CUTS RUST—
SOLD ON UNCONDITIONAL MONEY-BACK
GUARANTEE OF SATISFACTION

THE PRODUCT WITH OVER A THOUSAND USES

Auto Dealers Cashing in on Sales of RUSTSOLVO, the New, Handy Liquid Tool

Wherever metal parts are bound by paint, rust, carbon, burned or dried grease, red or white lead, RUSTSOLVO will free them quickly and surely.

Simply squirt a little RUSTSOLVO on the parts that are stuck. This powerful liquid works right in under the paint or rust, softens it up quickly, yet without harm to the metal. Parts can then be removed easily. No jerking or forcing with wrenches, no parts injured or completely ruined by hammer and cold chisel. You'll find a few drops of RUSTSOLVO the best "spring muffler" you ever saw. Takes away that squeak in a hurry and lubricates at the same time.

RUSTSOLVO is a NON-INFLAMMABLE liquid, free flowing and *with a pleasant odor*. RUSTSOLVO cuts rust, carbon, red or white lead, paint, tar, shellac, burned or dried grease, green corrosion on brass or copper. Positively does not injure the hands, wood, cloth, metal, leather or rubber.

Farmers, garage, auto, truck, and tractor owners, plumbers, housewives—every person who has any occasion to use wrench, screw driver, or hammer on used metal of any kind, is a live prospect for RUSTSOLVO. Hundreds of testimonial letters show how valuable RUSTSOLVO is to garage and auto owners. "As good as a set of tools." "Saves buying repair parts and keeps cars running." "Wouldn't be without it for anything."

RUSTSOLVO fills a big need and does its work well. It is sold on a money-back guarantee of satisfaction. It is quick turnover merchandise. It pays a good profit and pays it often by bringing in repeat orders for larger quantities.

Now is the time to cash in on our advertising campaign, which is acquainting thousands of buyers with the merits of RUSTSOLVO. Get a can and try it out for yourself, setting up new machines or repairing old ones. Your money back if RUSTSOLVO isn't the best rust-getter you ever saw. You be the judge of its power to make profits for you. Just pin the coupon to your letterhead with the money for the amount you want. Put up in handy oiler cans—4 oz., 8oz., and pints; bulk sizes, quarts, one-half gallons and gallons. 4 oz., 50c; 8 oz. 60c; pints \$1.00; quarts, \$2.00; one-half gallon, \$3.25; gallon, \$6.00. Pints and over shipped C. O. D., if you prefer. Ask for dealers' discount sheet.



A Few of the 1200 Uses of RUSTSOLVO

Good Wherever Metal Parts Are Stuck From Rust, Carbon or Friction

AUTOMOBILE, TRUCK, TRACTOR and GAS ENGINE—For freeing Taper Pins, Valve Cages, Piston stuck from Rust or Carbon, Spark Plugs, Pet Cocks, King Pins, Steering Knuckle Pins, Shackle Bolts and Nuts, Brake Anchor Pins, Clevis Pins, Brake Band Stud Bolts, Brake Rods, Emergency Brake, Body and Fender Bolts and Nuts, Radius Rods, Exhaust Manifold Bolts and Nuts, Studs, Caps, Water Jacket Nuts, Spring Clip Bolts and Nuts, Wheels from Axle, Tire from Rim, Battery Terminals, stuck from green corrosion, Pulleys and Keys.

HOUSEHOLD—For placing in good working order Sewing Machines, Door and Window Hinges, Casters, Water Cocks, Door Locks and Keys, Window Locks and for removing rust in general.

PIPE FITTING—For disconnecting Flanges, Elbows, Tees, Collars, Joints, Faucets, stuck from Heat, Rust, red or white lead, graphite, brine.

Rust Products Co., 64 East Lake Street,
Chicago, Dept. C 7.

I wish to try out RUSTSOLVO. Please send me..... size cans, prepaid.

I enclose \$..... } Mark Out One Line
Send the package C.O.D.

I will give it a good, fair trial and you are to refund my money if I am not satisfied with RUSTSOLVO.

Name

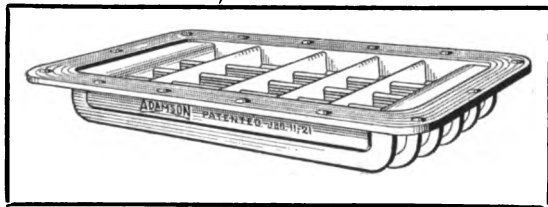
Town

State

RUST PRODUCTS COMPANY of AMERICA, 64 East Lake Street CHICAGO

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

able quantity past the engine pistons, thus diminishing the lubricating value as well as increasing carbonization of the cylinders and spark-plugs. The Adamson cooler is said to reduce the temperature of the lubricating oil considerably because of the continuous circulation of the oil through it.



Saves Oil by Keeping It Cool.

The low price at which this cooler is being offered makes it attractive to every Ford owner. Full details may be obtained from the Adamson Mfg. Co., East Palestine, Ohio. Please mention the American Garage & Auto Dealer when you write to it.

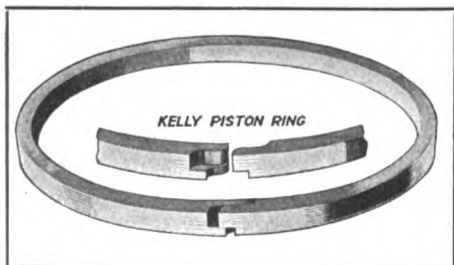
"A Ring for Every Motor," Says Kelly Piston Ring Co.

The interesting feature about the Kelly piston ring is that it is a one-piece ring—and it is this one-piece principle, says the manufacturer, which gives the Kelly piston ring the necessary quick action and permanent tension against the cylinder wall.

Then there is the reinforced L-shape construction of the joint which is said to make this piston ring indestructible and the sliding contact which the makers claim enables it to hold both oil and compression to a point far beyond any wear it will ever receive.

The further claim is made that, because these one-piece rings are "lathe-turned," the series of minute grooves thus produced reduce the "wearing-in" surface to a minimum and entirely eliminate the use of "lapping-in" compounds.

The fact that they are "lathe-turned" is said also to make the Kelly one-piece piston rings especially beneficial for replacement purposes, and the Kelly company guarantees that these rings will correctly seat in



Gives Quick Action and Permanent Tension.

cylinders which are worn a few thousandths out-of-round.

Still another feature to be noted in connection with the Kelly one-piece piston ring is that they are molded individually which, it is stated, filters the iron, produces a denser grain, uniformity of texture, a per-

manent wall pressure and freedom from porous or hard spots.

Of course, to produce the most satisfactory results, a piston ring must fit the groove in width to a close sliding fit. The Kelly one-piece piston rings are guaranteed by the manufacturers to be micrometer accurate in width to within a fraction of a thousandth.

Further details may be obtained from the Kelly Piston Ring Co., 1900-04 Third street, N. E., Minneapolis, Minn. Please mention the American Garage & Auto Dealer when writing to this company.

Piston Pins Packed in a Way to Aid Retailers.

A new method of packing piston pins has been devised by a leading manufacturer whereby a set of pins can be sold by the dealer without splitting a carton. This method is to pack a set of four, six or eight piston pins in an individual carton, according to the number and make of car for which the pins are intended. A four-cylinder car, accordingly, can be fitted out with new piston pins from a carton of four, a six-cylinder car from a carton of six, and so on.

Each individual carton is marked according to the contents, and a number of cartons are packed in a larger carton for the convenience of the jobber. Each pin in the carton is painted upon one end to indicate size—green for standard size, yellow for 0.003 oversize, red for 0.005 oversize, blue for 0.010 oversize and white for all odd sizes. The value of this method of marking can easily be appreciated.

The main reason for this revolutionary method of packing is that of convenience. When the dealer is to overhaul a car, it will probably need a complete set of new piston pins, one for each cylinder. Instead of having to break up a carton containing one or two dozen, he can take a brand new carton from his stock and use the entire carton.

In this way the preservation of the pins remaining in stock is made much more simple, as the protective coating of oil on each pin is liable to be removed in taking pins from a large carton. Not only that, but a dealer can more easily check up on his stock when he does not have to open cartons and count the contents. A glance will tell him what pins he has on hand.

This new system will also be of decided advantage to the jobber as he will be able to fill orders with greater ease and accuracy, and will also give him an additional selling point to impress upon the prospective buyer.

The manufacturer using this system can furnish pins in standard sizes and oversizes for any make of pleasure car and for trucks using Continental motors. The manufacturer is the well-known Burgess-Norton Mfg. Co., of Geneva, Ill. Please

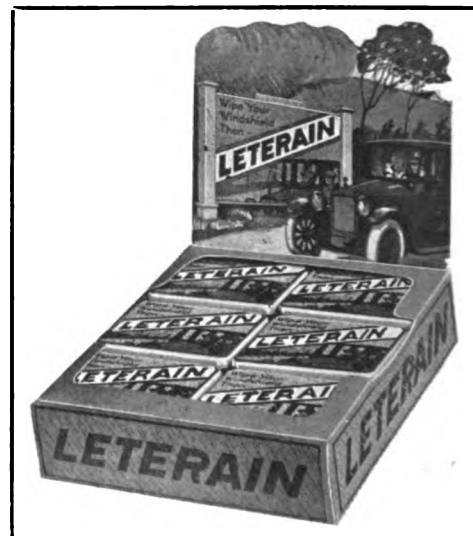
mention the American Garage & Auto Dealer when writing to the Burgess-Norton Mfg. Co. for further details.

"Letterain" on the Windshield—Your Customer Protected.

"Letterain" is the name of a new product on the market, and it is also the remark your customers will make when they have tried the product—for it is designed for use on windshields of automobiles so that rain will not impair sight through the glass.

The product is a "mit" impregnated with chemicals whose action neutralizes the natural affinity between water and glass, causing the water to flow in a smooth, transparent sheet over the glass.

The device is the result of long research work by Dr. John C. Baker the well known consulting chemist, in an attempt to discover chemicals that would effectively eliminate blurring of windshields by rain.



No More Blurred Windshields.

The life of the "mit" is guaranteed by the manufacturer for one year to retain its chemical properties. One treating of the windshield is said to be good for at least 12 hours' exposure to rain.

Letterain is packed neatly in a tin container, lithographed in five colors and gold. The cans are packed in the attractive showcase display holders of one dozen cans each. Numerous dealer helps are being created and the company plans to carry on extensive advertising to both dealers and consumers.

The B. J. S. Specialty Co. is the manufacturer of the product. The incorporators of the company are Dr. Baker, Victor Johnson, associated with the Street Railway Advertising Association of New York City, and Ben J. Sweetland, president of the Ben J. Sweetland Advertising Agency.

For further particulars concerning Letterain, write to the B. J. S. Specialty Co., Cedar and Greenwich Sts., New York City. And when you write for more complete details, mention the American Garage & Auto Dealer.

Tell us how GTD helped you —and we will pay you \$1.00 for every idea we can use.

LOOK at the list of GTD tools on this page or in our auto repair tool catalog—which you can get for a postal. You know every one of these tools. Somebody uses them all in the shop where you work. Each one has some special use in saving time, labor and money.

Read over the list—then try to think of some job done in your shop with one or more of these tools. Maybe it was rethreading a rim bolt with a "Hex" die. Maybe it was reaming out a Ford bushing—or drilling into a manifold.

\$1.00 for each job you will tell us about

List of Tools

*Here are the GTD
Tools to use in Auto
Repair Work:*

Taps
Dies
Drills
Reamers
Pipe Tools

GTD

We offer \$1.00 for each complete report we can use telling about some job done with any of the tools listed above. Read the rules in the panel below. Tell us about as many jobs as you like. Tell exactly what happened, how you fixed it, the tools you used, and the results obtained.

These accounts are to be published in our book about auto repairs. A check for \$1.00 for each account accepted will be sent as soon as passed on by us. Also a free copy of the book when published.

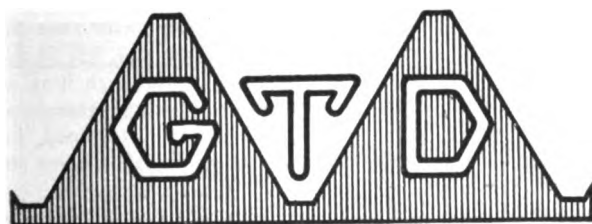
The Book Alone is Worth \$1.00, But It Will be Sent You Free

Of course you are familiar with GTD tools, but you want this new booklet containing the experiences of auto mechanics. To get it—sit down and write about your own experiences—and we will not only send the book but \$1.00 for each experience we can use besides. Pin your letter to the attached coupon for convenience.

RULES

1. Specify what tools used.
2. Tell part of car repaired, time saved, and any other details essential.
3. Write clearly—and as if you were telling others how to do it.
4. Only the first letter that arrives describing any specific job gets the money. Do it now.
5. No money paid for letters received after July 1, 1921.
6. Use separate sheet for each report.
7. Write on one side of paper only.
8. \$1.00 for each report accepted. Send as many as you like.

*A committee of impartial judges will
pass on acceptability of all reports.*



**Greenfield Tap & Die Corporation
GREENFIELD, MASS.**

GTD Taps, Dies, Drills, Reamers, Pipe Tools

**GREENFIELD TAP & DIE CORPORATION,
Greenfield, Mass.**

Please enter my name for your new booklet when published, free to me. I attach a letter telling about () experiences with GTD tools for which, if acceptable, you agree to pay \$1.00 each.

A. G. & A. D. 505

Up-to-the-Minute Garage Equipment

Veco Overhauling Stand an Aid in Bearing Work.

Garagemen, as well as those in all other lines of business, are recognizing that the demand of the present time is for better service. Naturally, in order to give better service, they must have the proper equipment.

The Veco Ford motor overhauling stand is an adjustable motor workbench, a bearing fitting machine, and a connecting-rod aligning jig—all combined in a substantially constructed unit that takes up but little room in the shop and can be easily moved about.

This overhauling stand has a handle lock, which is operated entirely with one hand, leaving the other hand free to swing the motor to the desired position. It is locked or unlocked almost instantly, and yet it is said to hold as solid as a riveted joint.

So that you may have your tools always at hand, the Veco motor overhauling stand is equipped with tool trays, so located that parts, shims, cotter-pins, wrenches and other tools may be placed in them ready for instant use.

Wheels make the stand easy to move anywhere, and the motor may be taken from the car, placed on the stand, and

bearing work may be done in a very short time, and without losing time in towing the car to start the motor.

For fitting bearings, the clutch on the hand-wheel shaft is slid into engagement with the flange on the crankshaft. A socket is cast in the face of the clutch for driving a bearing reamer if you use one. The long handles give plenty of leverage for reaming bearings or for turning the shaft with the bearing caps bolted down tight.

By keeping the caps down tight and scraping out the bright spots left by the wiping action of the shaft, it is stated that almost perfect bearings may be obtained.

Further, it is claimed that, with the Veco overhauling stand, you may be absolutely sure that connecting-rods are in proper alignment. The connecting-rods are fitted with the pistons in place in the cylinders, just as they are to run. You can either fit one rod at a time or all the rods at the same time, as the handwheel gives plenty of leverage for doing this.

Another valuable addition to garage equipment is the Veco rear-axle overhauling stand for Fords, Maxwells, Chevrolets, and all other cars having divided rear-axle housing.

One of the many advantages of using this stand is that with it you may keep the work and the floor clean.

This stand is said to be so designed and constructed as to make it of great value in overhauling rear constructions, not only as a time-saver but also as an aid in doing first-class work.

As may be seen in the illustration, the rear-axle housing is held by one-half only, so that the other half may be drawn off and axles and differential assembly drawn out in the least possible time. This form of construction also makes assembling very easy for the mechanic.

The vise or clamp jaws are closer together at the top than at the bottom, so that it is unnecessary to screw the handwheel tight in order to hold a rear construction in the horizontal position.

By merely screwing this wheel up hand-tight, the whole construction may be held in the vertical position, illustrated. This position makes the drive-shaft bolts and also the lower axle housing bolts easy to get at.

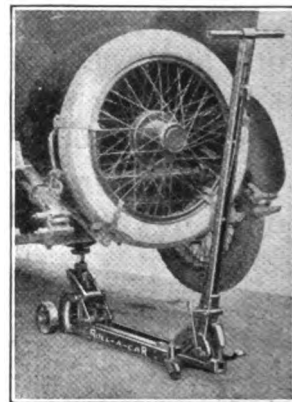
These stands are furnished with tool tray and removable grease pan, which are additional time-savers.

Further details concerning these two garage and repairshop aids may be obtained by writing to the Van Trump-

Eselbey Co., 1918 Cherry St., Philadelphia, Pa. Be sure to mention the American Garage & Auto Dealer when you write.

New Garage Jack Finds Favor with Garagemen.

After two years of experimenting, testing and developing, the Walker Mfg. Co., of Racine, Wis., has perfected the Roll-A-



A Husky Helper Is the Roll-A-Car.

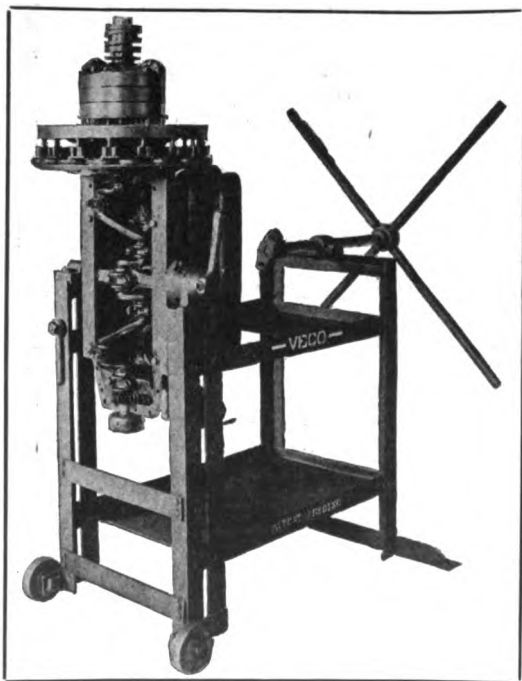
Car, a husky garage jack which is receiving favorable comment from users.

Garagemen, it is said, are enthusiastic about Roll-A-Car because it is so easy to operate. Even to lift and roll the heaviest car there is no need of bending over. A handy finger lever on the handle controls the entire functioning of the jack, and the leverages have been worked out to give a quick lift with short strokes.

With Roll-A-Car in position under a car, a touch of the toe on a trip lever instantly raises the rack bar into contact with the axle. Then a few short, easy strokes of the handle and the load is up, ready to be rolled into a parking place or to any other part of the shop. Six strokes of the handle raise the load six inches. Only by reversing the lever and pumping down can the load be lowered, so there is no danger of accident from bumping against the lever on the jack handle.

A feature which makes Roll-A-Car the ideal jack for use in a garage, states the manufacturer, is the fact that when a job is left jacked up, the Roll-A-Car handle can be set and left in any desired position, even upright, so it is always out of the way. In shop, garage and showroom, Roll-A-Car, it is said, has proved itself a time-saver, labor-saver and money-maker.

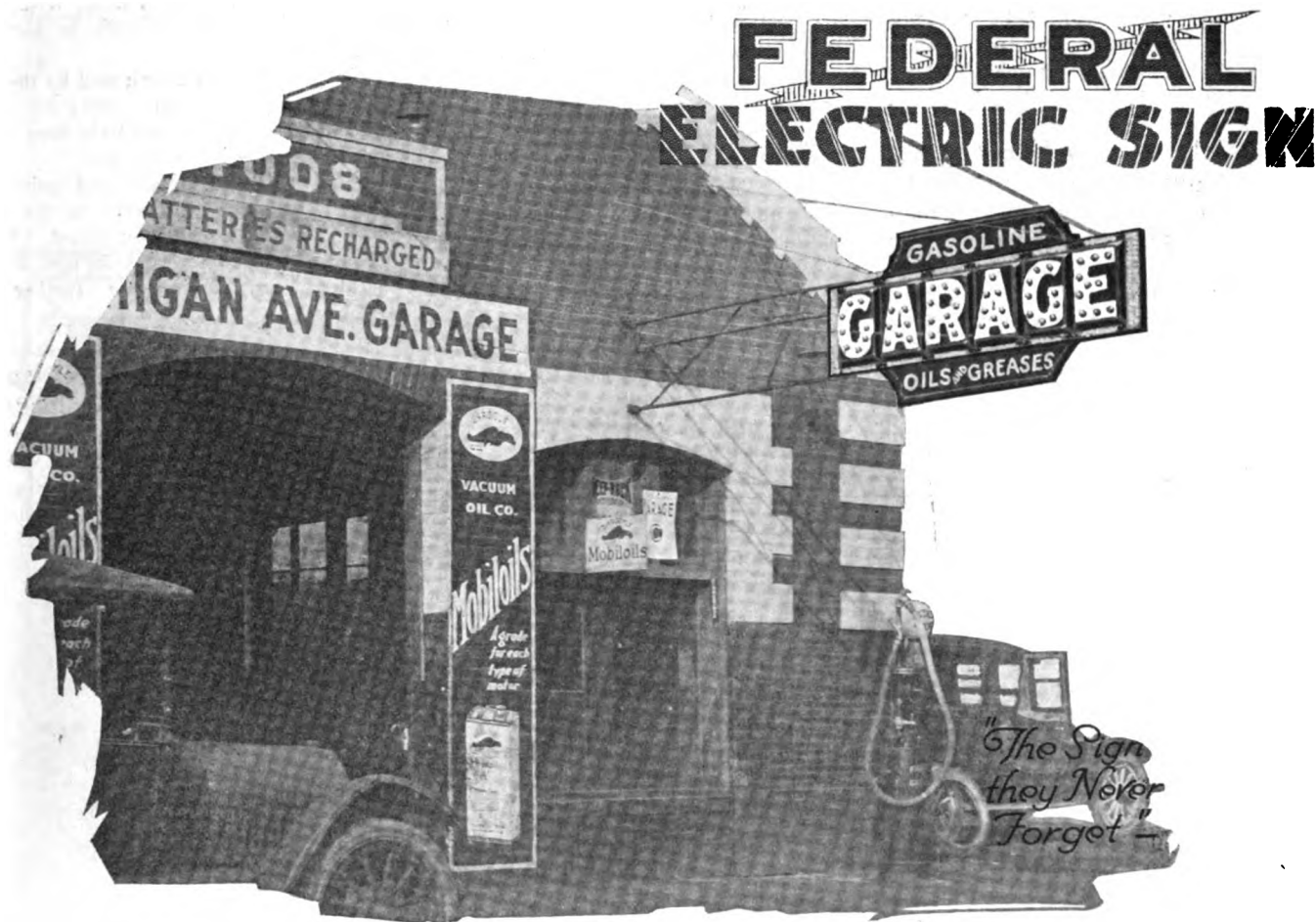
Like other Walker jacks, Roll-A-Car is substantially made of high-carbon, heat-treated steel. Roll-A-Car weighs only 120 pounds and has a capacity of 5,000 pounds. It is easily identified by its distinctive Walker blue color.



Bearing Work Easy With the Veco.

wheeled to any part of the shop without danger of upsetting. These wheels are so attached, it is said, that the solidity of the machine is in no way affected.

The manufacturer claims that perfect



—Inexpensive Advertising That Brings Results

Because their garages are lost in darkness, many garage owners lose many sales. Their competitors, with glittering electric signs lighting up their garage front, pull much of their paying profits away from them.

Prospective customers will not waste their time trying to find you. They know what they want and need and will go direct to that garage that advertises for their

patronage—a Federal Electric Sign draws them like a magnet.

And an electric sign is really the most inexpensive of advertising media. Costs but a few cents a day for electricity. Made of porcelain enameled steel—will not rot, rust or fade, and will last indefinitely.

Gain a step on competition. Send coupon today for full details, prices and **free sketch** showing how your sign will look.



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information, price and free sketch of a Porcelain-enameled Steel Sign for my business. Explain your 12-months-to-pay Plan.

Name City State

Street and No. Business

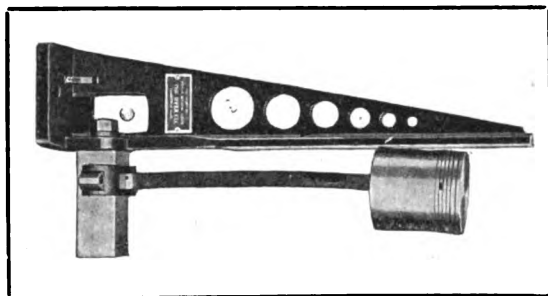
Store Frontage No. of Floors

AGAD-5

The manufacturer will gladly forward Roll-A-Car literature on request. Please mention the American Garage & Auto Dealer when writing the Walker Mfg. Co.

"Fort Hill" Piston and Connecting-Rod Aligning Gauge Is Universal.

The "Fort Hill" piston and connecting-rod aligning gauge, manufactured by the Dyer Co., of Cambridge, Mass., is finding great favor in garages and service stations. The makers claim that the gauge is a ne-



Quickly Straightens Bent and Twisted Rods.

cessity for cylinder grinding and reboring concerns, as well as service stations and repairshops, and that their extensive experience in operating a large regrinding department has convinced them that 75 per cent of the trouble connected with reassembling and installing pistons is due to bent or twisted rods.

Among the distinctive features claimed for the "Fort Hill" piston and connecting-rod aligning gauge are:

It is universal with one arbor, simple and complete for first cost; its micrometer accuracy is guaranteed, the machine being made by the same careful methods as is a micrometer; it has only one moving part, assuring lasting accuracy; and it can be quickly checked for accuracy by the user. It can be used with positive results by the average mechanic.

When writing to the Dyer Co., please mention the American Garage & Auto Dealer.

Good News! A Book Which Makes Income Tax Report Easy.

Never has it been of more importance to have an accurate and readily available record of business transactions than it is at the present time.

A very effective aid in keeping such a record will be found in the "A-Proved" weekly business statement and income tax book which is being distributed by the Accurate Accounting Auditing Co., of New York.

Everyone dreads preparing an income tax report. The government is growing more strict in enforcing the income tax law. You cannot afford to make mistakes. Your report must be right. With this new book, it is said, one can get at the facts quickly and all entries for the day may be made in a few minutes. You can tell at a glance any day, week or month

the exact state of your business affairs.

It is exceedingly compact and can easily be renewed each year at a small cost by securing new blank sheets. Instructions in any language desired are furnished with each book.

The "A-Proved" weekly business statement and income tax book has been approved by certified public accountants and also by the accounting department of the Accurate Accounting Auditing Co., Inc., of New York City.

This is an exceedingly convenient and easily kept accounting record, which will be found very helpful for any business. It is being offered at a very low price for so valuable a book.

For further details, write the Accurate Accounting Auditing Co., 405 Broome St., New York, and be sure to mention the American Garage & Auto Dealer when you write.

Universal Spark-Plug Intensifiers Make Satisfied Customers.

Don't let your customer guess or fuss around with screwdrivers or pliers, trying to find the cause of the trouble with his car, says the Clarkson company. "Tell him about the spark-plug intensifiers and trouble finders which are just being placed on the market."

The spark-plug intensifier is a great aid to motor ignition, says the manufacturer. It makes it possible to get satisfactory results from a plug which is worn out, or on which the insulation is broken. It is also claimed to make a plug that is fouled with grease or carbon, or that has a broken porcelain, fire perfectly.

If the magneto is not working properly, or if a wire is short-circuited or broken, or the batteries are out of order, by raising the bull's eye shaped glass cylinders, one can tell instantly. If the spark does not show, then the battery or magneto is not delivering the current to the intensifier.

Any plug can be fired by using the intensifier, states the manufacturer. The device has an adjustable terminal point set in a bull's eye cylinder of glass which magnifies the spark and gives a clear vision from every angle. If the ignition system is weak, simply loosen the hexagon nut on the side to which the terminal is fastened and give the screw a slight turn to partly close up the space between the two points in the glass cylinder.

Watch for the spark to leap across under various adjustments. When there is a good spark, hold the screw in place and tighten up the hexagon nut which locks it in place.

These spark-plug intensifiers are adjusted to suit the greatest number of cases. The proper distance is said to be about 1/64 of an inch, but this may be increased to 1/32 or even to 1/16 with good results if

the voltage is high enough to jump the air gap.

The intensifier is guaranteed by the manufacturer to save many times its cost in spark-plugs, which would have been thrown away as useless without it.

More complete details and prices will be sent to those who write to the Clarkson Co., 139 N. Clarkson Court, Chicago. Mention the American Garage & Auto Dealer when writing for further particulars.

New Visible Gasolene Dispenser Which "Delivers the Goods."

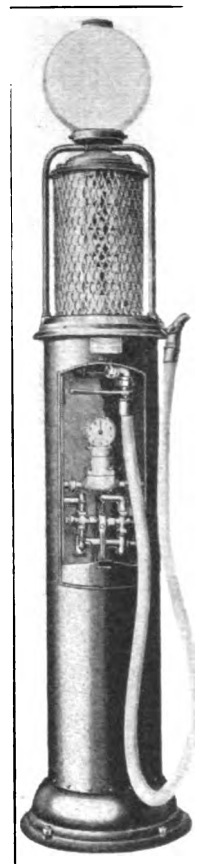
And that is just what your customers demand! In this day of action, you must "deliver the goods" or your business loses steadily. The new Catron visible automatic gasolene pump will aid you in meeting this demand of the public for service efficiency.

"Right now," describes the Catron action. There is no waiting or delay. Five gallons of gasolene flow to the visible delivering cylinder in 15 seconds and flow by gravity to the car in 25 seconds. These are said to be stop-watch figures on pumps which are in operation. The manufacturer claims for this dispenser that it will handle gasolene with the visible measure as fast as other pumps work "blind."

In addition, the customer not only gets his gasolene quickly, but he sees just what he is getting—and people are just as anxious to see what they are getting when buying gasolene as when buying other commodities. The visibility feature takes with customers. It gives them an impression of straight-forward honesty of service that is pleasing to them.

The Catron has two visible measures—one fixed and one mechanical. The cylinder is measured by a U. S. standard liquid measure and the overflow is set permanently. When filled, the cylinder holds just five gallons. There cannot be more. The gasolene rises quietly and smoothly into the cylinder with no commotion, and it can be accurately judged while flowing.

In addition to the visible fixed measure, there is a full-jeweled meter which can be checked against the fixed measure. This meter is operated by the flow of gasolene.



The Catron.



A Big Business Booster

Boy and Slate
SIGNS
 Make
SALES
 and
SMILES

Here is over six feet of the greatest attention-getting, sales making, fun-producing novelty ever offered any dealer in any line.

This Boy and Slate Sign, on account of its great size, its four attractive colors and interesting sayings is making a hit with the public and producing sales for the dealer wherever it is displayed.

The unusual feature of this sign, outside of its size and "make-up," is the clever, witty sayings that are chalked on the slate. We furnish you enough of these sayings to last a whole year, changing them every other day. People stop, look and read these sayings and then come back for more. In the meantime you are getting the benefit of this publicity; you are making new friends for your business, and results are sure to follow.

The sign is over six feet tall, cut out to make it look natural. It is supported by frame work so that you can set it upon the curb or wherever it will attract the most attention.

There is nothing like this sign; nothing that will make you and your business so much talked of and thought about; nothing that will so help to make sales.

Send Today for Our Offer

Write for this sign and for particulars about our scientifically refined En-ar-co products, the satisfaction builders. Get our extremely liberal dealer proposition. We make En-ar-co Motor Oils, En-ar-co Gear Compound, White Rose Gasoline and National Light Oil (kerosene) which are the highest types of scientific refining on the market. Send the coupon in today.

THE NATIONAL REFINING CO.

National Headquarters, C-731 National Bldg., Cleveland, O.
 4 Modern Refineries—100 Branch Offices

THE NATIONAL REFINING COMPANY
 C-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

I now selloil

It gives an accurate record of the total gallons passed through the dispenser, enabling the garageman to accurately check his sales against the tank.

Only two movements are required to operate this dispenser of gasoline—press the exhaust valve button with the thumb of one hand, raise the operating lever with the other. When the meter shows the required amount, push the operating lever down and remove the thumb from the air release valve. One short movement of the dispensing valve turns the gasoline into the car smoothly and without undue pressure to cause "bubbling" or overflow.

The machine is operated on air pressure from the tire supply tank, and the head of air stored in the air receiver will operate the Catron for several hours, should the electric power be shut off for any cause.

Gasolene handling is dangerous under the best of conditions—therefore, the equipment for that purpose should be as safe as it is possible to have. In the Catron there is no source of fire or explosion. The construction insures freedom from leakage. In operation the only gasoline subject to pressure is the 20 gallons held in the auxiliary pressure tank. This tank, furnished as part of the equipment, is sunk alongside of and slightly below the usual storage tank, from which it automatically syphons gasoline as needed.

When air is applied, check valves in the syphon line prevent pressure from entering the main storage tank. Closing the operating valves permits the automatic syphon to operate. The timing of the operating valves opens the outlet for gasoline before any air is admitted to the pressure tank, while the pressure reduction valve allows only 25 pounds of air pressure to enter the machine.

An air gage on the machine and a standard safety valve provide further safeguards, and the control of the exhaust valve makes it impossible for the machine to be kept under pressure when not in operation. When closed, the machine is claimed to be absolutely safe, the hose being locked on the inside of the case. Closing the door operates the automatic drain valve, insuring that no gasoline stands in the tank when the machine is closed. The arrangement of the control does not permit the machine to be operated until this drain valve has been closed by opening the door to the fullest extent.

The approval of the Underwriters Laboratories is the acid test. Every Catron bears the Underwriters' label.

The Catron is simple in design. There are no rapid moving parts to wear, and all valves close and open slowly and fit tightly. Freedom from repairs is said to characterize the performance of every Catron pump in operation and is the best assurance of continued operation. There is practically no expense for power, as the air compressor must be run to fill the tire supply tank and the Catron uses very little air.

The cost of installation is small. Present storage tanks or any standard type of tank may be used. The blue prints, specifications and instructions sent with each dispenser enable any ordinary pipe fitter to install it without difficulty. All connections are made outside of both tanks.

The Catron Mfg. Co., Bonham, Tex., will gladly supply any further information desired regarding this practical new gasoline dispenser. When writing to it, be sure to mention the American Garage & Auto Dealer.

New C-O Universal Burning-In Machine on Market.

Announcement is made to the automotive trade, jobbers and garage repairmen, of the development of a universal burning-in and running-in machine, designed and built by the Canedy-Otto Mfg. Co., of Chicago Heights, Ill.

The manufacturer claims for this machine that it will positively burn-in and run-in the bearings of any type motor. Only one attachment is required and this is needed only for burning-in valve-in-the-head V-type motors. It is quickly attached and comes as part of the regular equipment. This attachment will also handle motors which do not have detachable heads, an operation which has puzzled the repairman for many years.

The table is raised and lowered by a single control. This table is grooved like all high class machine tool tables and the motor clamps can be adjusted to size of motor. The table also serves as a sump or crankcase for the motor, so that the crankshaft splashes in fresh oil—in every way similar to the actual performance of the motor in operation.

The clutch is an extra heavy toggle type, driving through a silent chain, which is so noiseless that the operator can test the timing of the motor or detect noises after the bearings have been run in.

The machine requires a floor space of

only 90 inches over all, with an actual base measurement of 79 inches; 20 h.p., it is stated, is sufficient to run the machine to capacity, under the most severe conditions, with the largest of motors. A single lever controls the raising and lowering of the table with a tension lock. All parts are highly machined to the usual standard of accuracy maintained in all Canedy-Otto equipment.

The Canedy-Otto Co., Chicago Heights, Ill., will gladly send detailed illustrated bulletin to anyone who is interested. When writing for this bulletin, mention the American Garage & Auto Dealer.

Dependable Pumps Aid Business Four New Boe Products.

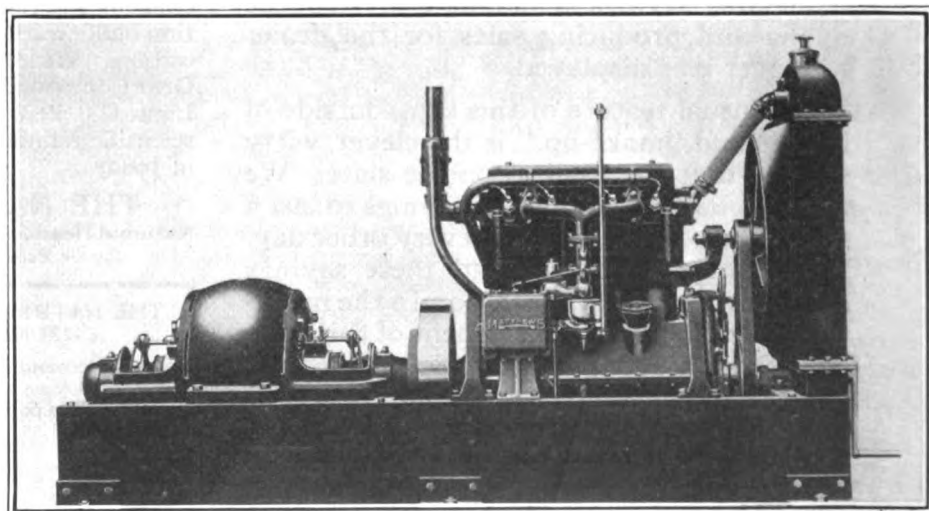
The new Boe double-action grease pump may be operated either by forced air pressure or by hand. To the garageman who wants quick, accurate and reliable service it is promised that this pump will prove a really efficient item in garage equipment.

The air pressure is applied through an air valve in the cover, the same as for an automobile tire. An air pressure gage, mounted in the cover, shows the amount of pressure applied. The air need not be applied while using, but the air charge should be kept up to 60 to 90 pounds for quick service.

This double-action grease pump has a seven-inch cover, which can be opened or closed in a few seconds by a patented cover-lock arrangement. No tools are needed, one large wing nut closing the cover perfectly air-tight; the cover and the seat for it being carefully machined.

The graduating fingers shown on the air-line pipe leading from the head of the tank to the head of the measuring cylinder are each adjustable to show one-half pound or one-half pint, Imperial or any other foreign standard of measure.

The contents in the measuring cylinder



An Efficient Aid for Burning-In Bearings.



Clerk D is making change from his cash drawer. The amount of the sale is shown at the top of the register. The other clerk is handing change and parcel to the customer. He made change from his own cash drawer.

A separate cash drawer for each clerk

This makes clerks more efficient because:

- ① Each clerk is responsible for the business he handles.
- ② In case of error it shows who made the mistake.
- ③ It gives each clerk credit for the work he does.

An up-to-date National Cash Register with separate cash drawers measures the ability of each clerk.

Up-to-date National Cash Registers are made with any number of cash drawers, from one to nine.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL
CASH REGISTER CO.
DAYTON OHIO.

are compressed under forced air pressure, thus, it is stated, making the measuring as accurate as any scale or measure. The capacity of the cylinder is three pounds.

The manufacturers claim that it is impossible to give incorrect measure with the Boe double-action grease pump, provided that the indicators on the air-line pipe are properly spaced and adjusted, and that it wins the customer's confidence because of the evidence given of honest measurement.

The measuring cylinder has a leak-proof piston plunger construction, which the manufacturer states is the company's exclusive patent, and which is similar to the plunger used for its lever action barrel grease pump.

So simple in action is this pump that it may easily be operated by one person. The pump handle indicator, B, moves automatically up or down past fingers marked $\frac{1}{2}$, 1, $1\frac{1}{2}$, etc., by applied air pressure and under the perfect control of the operator.

A piston float keeps the top of the contents in the tank leveled out, and discharges the last vestige of lubricant in the tank but not the air pressure in it. Likewise, it will discharge the entire contents in the measuring cylinder but not the lubricant in the discharge hose. The discharge of the lubricant to the point of use automatically stops when the measuring cylinder is empty, thus making it possible for the operator to set the pump to dispense any exact quantity desired.

The manufacturer further claims that the pump will handle easily, at 75 pounds air pressure, any such lubricant as will barely flow or gravitate, as well as the softer grades of so-called non-fluid, silent gear, and fiber gear greases. It can, however, be operated by hand for dispensing soft or semi-fluid lubricant, indicator B then being used as a pump handle.

The double-action grease pump is furnished in two sizes only, with an extra

heavy pressure tank and high-grade steel-lined discharge hose.

The second of these new pumps is the Boe repeater barrel oil pump, which may be used in connection with any oil barrel and is designed for the quick handling of motor oil, kerosene, etc.

It can be attached to the original oil barrel and is ready for business in a few seconds. A wing nut locks the entire pump rigidly to the barrel, and it will fit any ordinary 30 to 55-gallon upright or lay-down, wood or steel barrel. It is attached to the lay-down type of barrel in the same manner as the lever action barrel grease pump.

It is said to measure accurately one quart or one pint to each pump stroke, a ringed hook engaging the stop governing the pint stroke, and can be almost instantly adjusted for Imperial or other foreign measuring standards if desired. The overflow drains back into the barrel from the large drain pan.

This pump, also, has the patented leak-proof pump plunger construction, and, it is claimed, the expanding spring cups increase the life and efficiency of the piston plunger ten-fold and insure perfect suction until the piston cups are entirely worn out.

The Boe push and pull pump is a high-grade, 25-pound capacity portable grease pump of simple and durable construction for the individual user or for the garageman desiring an inexpensive, reliable and accurate grease-dispensing device.

It has a double check on measuring, and the pump stroke is adjustable for $\frac{1}{2}$ pound or $\frac{1}{2}$ pint and it has a five-inch indicating meter dial plainly readable through a large window in the cover.

As with the two pumps just described, the push and pull pump also has the patented piston construction. It is designed for the quick handling of semi-fluid gear greases only but will also handle soft grades of so-called non-fluid or fiber gear greases.

The fourth pump is known as the Boe lever action pump and barrel truck, with which, it is said, any barrel may be made a portable grease dispensing pump, the truck tongue acting as a pump handle for operating the grease pump.

The truck is rolled up to the barrel and the bottom hooks of the truck slipped under the barrel. Then the caster wheel hook is dropped down on the top rim of the barrel, the barrel and truck tipped down, and the steel-lined intake hose inserted into the barrel.

Next the pump is hooked onto the top of the barrel and the truck tongue hooked onto the piston-rod. All is completely assembled and ready for business in a few seconds.

The leak-proof, ten-ply pump plunger construction is declared to make the measure absolutely accurate and increase the efficiency and life of the plunger ten-fold. To this is added, it is stated, another new principle in grease pump construction in using the same size pump cylinder as the intake hose.

Write the Boe Mfg. Co., Minneapolis, Minn., for detailed information concerning these excellent new aids to the garageman and be sure to mention this magazine when you write.

Legal Notice.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of the American Garage & Auto Dealer, published monthly at Chicago, Ill., for April 1, 1921.

State of Illinois, County of Cook, ss.
Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the editor of the American Garage & Auto Dealer, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago.
Editor, S. R. Edwards, 116 S. Michigan Ave., Chicago.

Managing Editor, S. R. Edwards, 116 S. Michigan Ave., Chicago.
Business manager, J. R. Hastie, 116 S. Michigan Ave., Chicago.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; J. W. Hastie, 26 S. Hamlin Ave., Chicago; E. C. Hole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

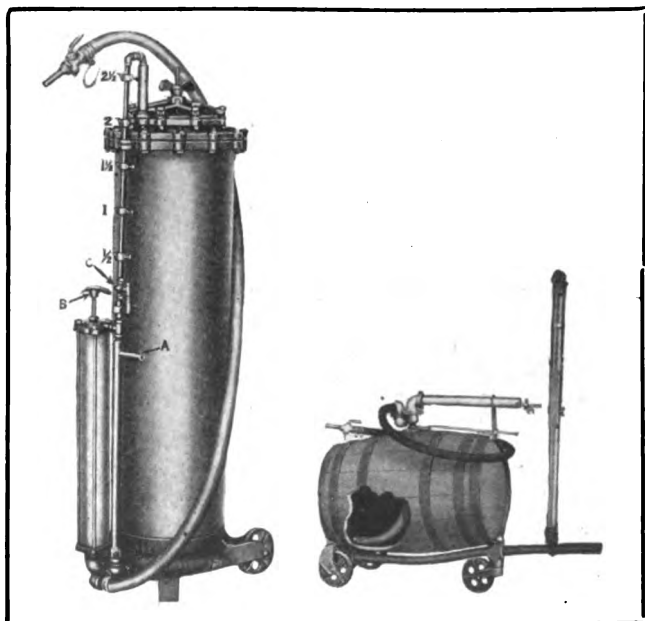
S. R. EDWARDS.

Editor.

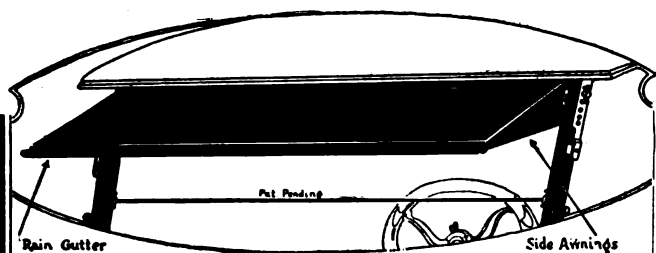
Sworn to and subscribed before me this 1st day of April, 1921.

E. V. CROSS,
Notary Public.

(My commission expires Oct. 23, 1924.)
(SEAL)



Two Pumps Which Will Make Your Work Easier.



Stops the Glare Front and Sides

SUNSHINE, rain, snow and headlights, blinding hazards of motoring, are overcome more effectively by the New Era Visor than by any other similar device. And the motorist can see instantly that the New Era will do its work. The rain-catching gutter and the drip-shedding metal awnings at the ends tell their own story. Made of heavy steel and baked gloss enamel outside and dull green underneath. Adjustable to height. Packed in individual wood cases.

NEW ERA DeLuxe VISOR all metal



The One-Man Bumper

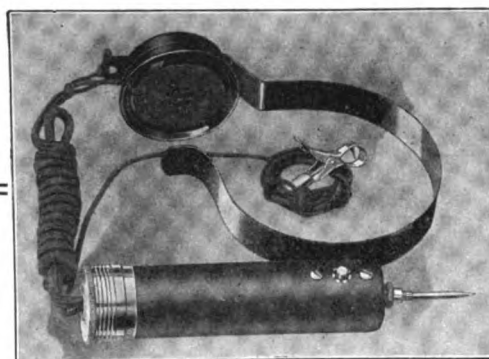
A NEW ERA Duplex Bumper can be installed by one man in less time than is required by three men with the ordinary bumper. The interchangeable arms make this possible. And this same feature cuts your stock to the minimum. Presents a 6-inch steel wall as a guard and weighs only 30 to 40 lbs. Nicked on zinc and copper—always bright. Write today for catalog of bumpers, visors and springs.

NEW ERA Duplex BUMPERS

NEW ERA SPRING & SPECIALTY CO.

56 Cottage Grove Ave., Grand Rapids, Mich.

Here is the Electrical Testing Set you have been looking for



The SCOUT

Inexpensive
Compact
Dependable

This simple instrument will determine accurately the condition of any kind of electric wiring. It is unexcelled for testing for shorts, grounds and crosses. Any electrical trouble is quickly located by the man with the SCOUT. On every phase of electrical work—manufacture, installation, inspection or repairs, the SCOUT is a distinct time saver and helper.

Every garage and repairman should be equipped with a SCOUT. It greatly simplifies tests on automobile wiring and saves a lot of time and labor. With the SCOUT you can eliminate most of the time usually expended in locating trouble and thus increase your profits on electrical repair jobs.

The SCOUT is entirely self-contained and is exceedingly compact and light—can be carried in your coat pocket. The source of testing current is a standard flash light battery placed in the handle.

The results it gives are accurate and dependable.

PRICE ONLY **\$6.50** ORDER TODAY

LEICH ELECTRIC CO.

Manufacturers of RADD Spark Plugs

GENOA

ILLINOIS

LEICH ELECTRIC CO.,
Genoa, Ill.

Please send me C. O. D. a "SCOUT" Testing Set. Price \$6.50.

Name _____

Address _____

Here and There in the Motor World

"Bearcat" Battery Produced by New Detroit Organization.

A corporation composed of automobile and storage battery men of Detroit has been formed for the manufacture of automobile storage batteries under the name of the Barco Battery Co. The new product of the company is called the Barco "Bearcat."

"While the battery is just beginning to be built commercially, there are many Barco Bearcats now in service," said P. B. Williams, who heads the organization. "We put them into a number of automobiles in Detroit to see if they gave as excellent results under actual service conditions as they did in laboratory tests. In fact, it was the chance remark of one of these motorists that gave us the battery's second name: 'I'll tell you when it comes to starting my car on a cold morning, that battery is a regular bearcat.'"

The seven standardized models of the Bearcat battery fill the requirements of 99 per cent of all electrically-equipped automobiles in use, says the manufacturer. It is possible for a dealer to keep an ample supply of all models without tying up a great deal of capital.

The plates in the Barco Bearcat are made by a special process which results in the combination of an extraordinary high momentary discharge, exceptional recharge efficiency, and tough, hard plate-surface that enables the battery to stand up for an unusual length of time under the abuse to which automobile storage-batteries are subjected. The battery is guaranteed for 18 months.

National distribution is rapidly being built up. More complete details can be obtained from the Barco Battery Co., whose offices and factory are located at 83 West Fort St., Detroit, Mich. Mention the American Garage & Auto Dealer when writing for further particulars.

Lyon Metallic Mfg. Co. Employs Service Engineer.

It has been announced recently that H. A. Steere, of Detroit, Mich., has joined the Lyon Metallic Mfg. Co., in the capacity of service equipment engineer.

Mr. Steere has been connected with the automotive industry since its inception. He operated the third garage opened in Cleveland, Ohio, and has made a close study of automobile service and sales. Eight years ago he went to Detroit, where he had experience in the Ford parts department and in several service stations.

This work emphasized to him the necessity of more systematic storage in service stations, and he conceived the idea of equipment with compartments designed to

fit the exact parts the dealer must carry. At first, Mr. Steere simply sold blueprints of the racks to larger service stations, the equipment being made primarily for handling Ford parts. Later the equipment was manufactured from wood, being shipped out complete even to the numbering of the bins, which carried the Ford parts numbers.

In his new connection, Mr. Steere will be able to combine with his extensive experience the ability of the Lyon Metallic Mfg. Co. to produce strong, compact, adjustable steel equipment. An improved design of the equipment for Ford service stations has already been perfected. Complete data will soon be available and will be sent to those interested upon request.

New Manager of Schrader's Toronto Branch.

Stephen A. Howell, formerly in charge of the Chicago branch of A. Schrader's Son, Inc., has been promoted to the post



Promotions Rapid for Stephen A. Howell.

of manager of the Schrader Toronto branch, succeeding Harold R. Cole, who is now at the main office of the company at Brooklyn, N. Y.

Mr. Howell joined the Schrader organization at Brooklyn in 1915, and, through close application to his duty, was rapidly advanced to a position of trust. His wide sales experience, both at Brooklyn and Chicago, will enable Mr. Howell to continue and to expand the efficient service which Schrader aims to give its customers.

B. F. Goodrich Rubber Co. Celebrates Its Golden Anniversary.

A man whose pioneer work in the rubber industry was destined to figure prominently in the development of the automobile, but who did not live to see a "horse-

less carriage" was honored in a recent celebration in Akron, Ohio. His name was Dr. Benjamin Franklin Goodrich, founder of the rubber company bearing his name.

December 31 marked the golden anniversary of the founding of the B. F. Goodrich Rubber Co., the parent factory of the "Rubber City". The company was incorporated December 31, 1870. Officials and employees of the company, residents of the city, and thousands of friends and customers throughout the country joined in paying tribute to the memory of Dr. Goodrich and in observing the termination of a full half century of the company he established.

The Goodrich company is commemorating the anniversary by publishing an attractive 48-page book called the "Golden Year of Goodrich" telling of the romance of the rubber industry, its history, and what great importance it had in the progress of development of the world. The book was written by Wilbur D. Nesbit and illustrated by W. T. Benda, the famous Polish-American painter.

Paragraphs.

REES MFG. CO., 7501-11 Thomas Blvd., Pittsburgh, Pa., is the new name of the company formerly known as the Iron City Products Co. This change has been made in order to have the name of the company conform with that of the product manufactured by it—the Rees jack.

BUTTERFIELD & Co., Derby Line, Vt., announce that a complete stock of their tools is now carried in New York, at 62 Reade St., together with the stocks of the other two divisions of the company, viz: the Union Twist Drill Co., and the S. W. Card Mfg. Co.

FRANK CHAPMAN, of the M. W. Dunton Co., Providence, R. I., has recently accepted the position of secretary for the state of Rhode Island for the China famine fund drive which will cover a period of six weeks. His entire time is being devoted to this drive in an attempt to make it a tremendous success.

W. R. MELCHER, formerly eastern representative of the Gemco Mfg. Co., has returned to the C. A. Shaler Co., Waupun, Wis., with which he was associated during 1918-19.

Mr. Melcher will act in the capacity of special jobbers' service representative on Shaler vulcanizers and the Shaler road-lighter.

THE BURGESS-NORTON MFG. CO. announces that the B-N line, consisting of B-N piston pins and automobile accessories, and Bur-Nor hardware specialties will be sold to the jobbing trade in Minnesota, Missouri, Iowa, Kansas and Nebraska by H. F. Libby, of Kansas City.

VECO FORD MOTOR OVERHAULING STAND

MULTIPLIES PROFITS *on* FORD MOTOR REPAIRS

by greatly reducing the time required to do the work. The VECO is the only Ford Motor Stand which permits quick shifting of the motor from one position to another. The specially devised handle lock of the VECO can be operated with one hand, leaving the other free to swing the motor from one position to another.

An Outfit of Many Uses

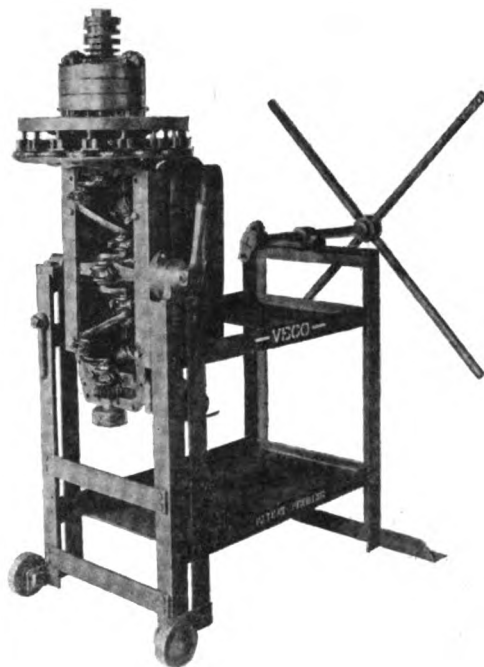
The VECO Motor Overhauling Stand (shown in illustration) is an adjustable work bench, a bearing fitting machine and a connecting rod jig—all combined in a substantially constructed unit that takes up but little room in the shop. It is portable yet rigid.

Perfect bearing work in record time is done with the VECO. The long handles give ample leverage for reaming bearings.

This VECO outfit in your shop means MORE work, BETTER work and BIGGER profits.

All VECO Equipment is sold under an iron-clad guarantee. Every machine is constructed of the best materials and is made by skilled mechanics.

SPECIAL PRICES—For quick action special discounts have been made on VECO EQUIPMENT. Write at once for complete data.



VAN TRUMP-ESELBEY CO.

1918 Cherry Street

Philadelphia, Pa.

Our Bearing and Lubricating Experts Are at Your Service

to assist you in any bearing troubles. Ship us one by parcels post—one of your own bushings—and we will treat it and return it next day without cost to you. Test it on your own work. We guarantee a saving of 80% to 90% in your lubricating oils on any service.

Designing
Developing
Detailing
Delivery

Experimental Work and Models for inventors and others.

Air and Ammonia Compressors, Tractors and Accessories, Automotive Trucks, Power Transmission, Clutches and Gearing.

Internal Combustion Engines for any fuel from crude oil to gasoline, either two-cycle or four-cycle, and for any purpose from farm to airplane engines.

Filtering Systems for lubricating oils or gasoline piping.

Labor saving devices.

Concrete Tanks for any liquid.

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NOW IS THE TIME

to fix up your old engine

We specialize on engine work, particularly two-cycle marine, while laid up for the season

Peerless Engineering Co.

EXPERT ENGINEERS

Lock Box 1472

Cincinnati, Ohio

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

SCHRADER UNIVERSAL VALVE CAPS



Should Be on Your Shelves

Valve Caps are an essential part of the Tire-Valve Stem. They should always be used to keep foreign matter from entering the mouth of the Valve Stem.

They are every bit as essential to the long life of tires as

SCHRADER UNIVERSAL

TIRE PRESSURE GAUGES
PUMP CONNECTIONS
KWIK-ON-AN-OFF DUST CAPS
VALVE-REPAIR TOOLS

Now come packed in handy metal boxes, five in a box. Price 40 cents a box.

A. Schrader's Son

Incorporated

Brooklyn, N. Y.
Chicago Toronto London

(Copyright 1921, by
A. Schrader's Son, Inc.)

Cut It Out, Brother, Cut It Out

Away with delay, the trouble and expense of repairing scored cylinders, cracked water jackets, aluminum cases, covers, and other aluminum and iron castings by old time methods. Old fashioned, expensive and unnecessary operations must give way to direct action.

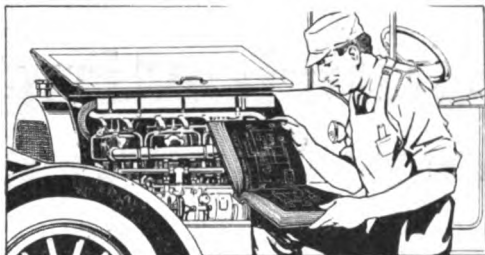
F. A. A. CAST IRON AND ALUMINUM MENDS Go Straight to the Job



No Welding. No Re-Grinding. No New Pistons. No Warping or Cracking. No Waiting. Saves Dollars on Each Repair.

Send for Trial Order and Directions.

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206 9th St. MILWAUKEE, WIS.



Is A Wiring Job A Guessing Contest? NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and strangers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car or truck since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

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N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England. Motor Technique Bureau, 149 Strand, W. C. 2

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*We Specialize in Systems for Automotive
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Handle Grease Easily — Swiftly — Cleanly with an **O'BRIEN** Heavy Duty Grease Pump

The easiest and quickest operating grease Pump on the market.

Just roll it up beside the car, set the gauge and run the handle down. The most inaccessible transmission or differential can be filled in two or three minutes. Not a spot of grease on yourself, car or floor. Neither is there a trace of it wasted. And there's 10 to 20 minutes saved each time.

Handles all weights of grease as well as oil.
Capacity 125 pounds or 15½ gallons oil.

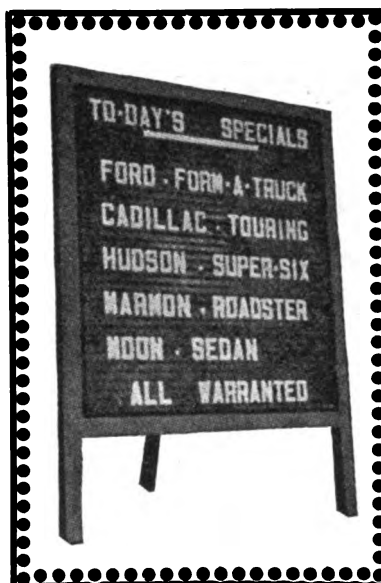
Discharges two pounds of grease at one stroke of the piston.

High quality and workmanship guaranteed.

IT DOES YOUR DIRTY WORK

Ask your jobber about them or write us for complete information.

**The
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Multiply profits by "speeding the turnover"

To make really worth while profits on those used cars, you must move them *quickly*. UNITYPE SIGNS not only stimulate used car sales—but—actually sell them for you—they bring new customers off the streets.

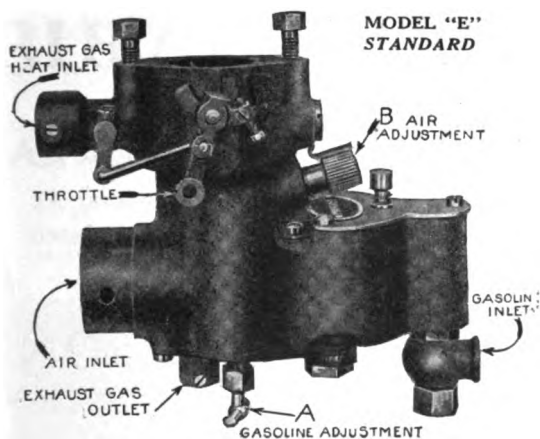
UNITYPE SIGNS are a further asset to your business by the improvement they effect in the appearance of your show room. These changeable signs—strong white on black (quick changing) will brighten up and modernize your place.

UNITYPE SIGNS

are all metal and come in many styles and sizes at prices within your reach.

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GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.



There are no dull times for the shop with the ECLIPSE

Every car has to have its valves ground from time to time. This work goes to the shop best equipped to do it.

The ECLIPSE ELECTRIC VALVE GRINDER is a light portable power driven tool that requires only a minute to smooth valve face and seat to a clean, hard, gas-tight finish. Better service for your customer—bigger profits for you.

Write today for complete data.

Eclipse Electric Valve Grinder Co.
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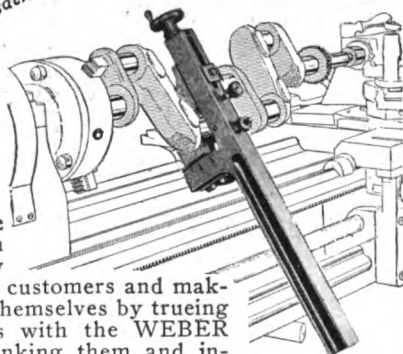
There Is Money in CRANKSHAFT WORK

PROOF with the
WEBER TOOL

(Are you interested in Profits and satisfied customers?)

SEND FOR
THIS BOOK~
It will tell you.

How garages, machine shops and repairmen all over the country are saving money for customers and making more money for themselves by trueing up worn crankshafts with the WEBER TOOL instead of junking them and installing new ones.



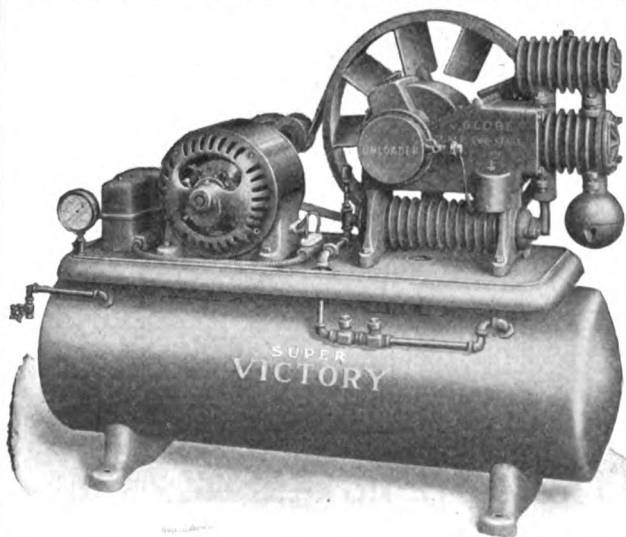
With one setting of the crankshaft on centers, you can turn all crank-pins with the WEBER TOOL absolutely round and straight to factory standards, spending not more than ten to twenty minutes per pin.

At your jobber or write direct.

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SUPER TWO-STAGE MOTOR- DRIVE COMPRESSOR UNIT



A NEW TYPE COMPRESSOR designed especially to handle Giant Pneumatic Tire Service and all other heavy-duty requirements up to 350 pounds.

Bulletin describing complete line of sizes and equipments on request.

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GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

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The GARDNER is an air compressor that has over 60 years of reputation behind it. For complete information see our full page ads or send for illustrated circular in colors.

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KENNEDY Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

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Easy Riding

Guaranteed

**HARVEY SPRING &
FORGING CO.**

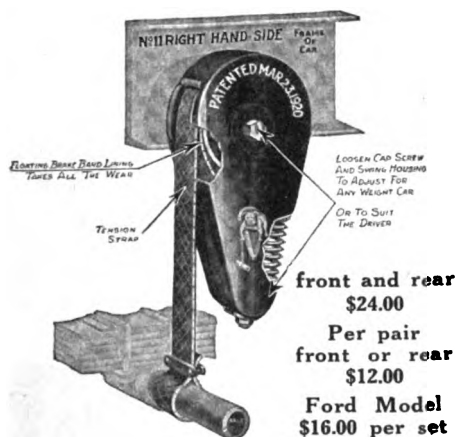
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RACINE

WISCONSIN

Every Road a Boulevard

when a car is equipped with
"BULL DOG" BOUNCE ABSORBERS



FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. **NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE.** Easily attached; needs no oiling; has no metal parts that will wear or break.

JOBBER! DEALER! Write for liberal discounts.

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 225-231 West Erie Street CHICAGO, U. S. A.

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THE ROMORT AIR and WATER STATION Brings it to Your Door

A Romort Air and Water Station installed in front of your place of business will bring hundreds of new customers to your door.

It is a hard working silent partner that creates the good will of the Motorist and establishes a point of contact that makes business easy to get.

To the Motorist, Romort Service means an air hose that never dangles in the mud and dirt to soil the hands and clothing when used and a convenient hose that fills radiators with water in a jiffy.

Model S-D

Counter Balanced arm with automatic return check.

Five other models with and without electric light, for curb, wall and ceiling.

Write our sales dept. today for full details.

Manufacturers
 The Romort Mfg. Co.
 Oakfield, Wis.

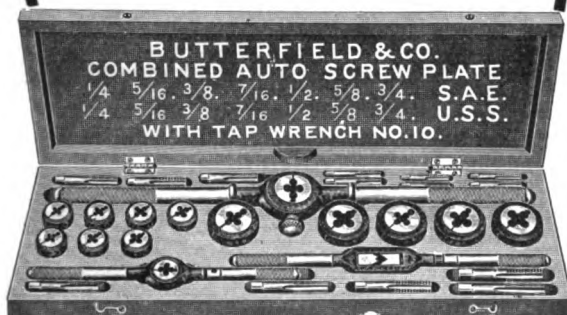
SALES DEPT.
THE ZINKE COMPANY
 1323 Michigan Avenue
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BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

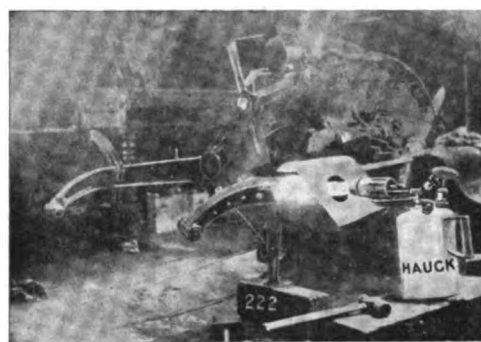
Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.
 62 Reade Street NEW YORK, N. Y.
 11 South Clinton St., Chicago, Ill.



Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

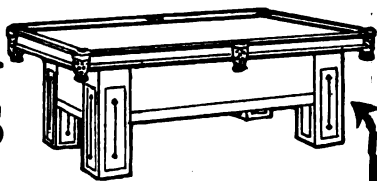
A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

*Write for prices and copy of Bulletin No. 104
 "Quick Auto Repairs"*

HAUCK MANUFACTURING COMPANY
 126-134 Tenth Street, Brooklyn, N. Y.

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For Immediate Delivery

Large selection, highest quality "Pix" Billiard Tables. Also all other billiard parlor fixtures. Wood or Steel. Lowest prices. Estimates furnished. . . . Write for full catalog 6407.

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CHALLENGE BATTERY PLATES

(JOHNSTON PROCESS)

For all Standard Makes of Batteries.

Guaranteed Two Years
(when used with Challenge Separators)
None Better. By Service Test

Price 15c and up

Service Stations!! Be Wise!!

Build your own battery with CHALLENGE Plates and Separators and make larger profits.

Challenge! One hundred dollars' reward for a better plate chemically.

CHALLENGE BATTERY CO.

16 W. Illinois Street

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For Those Who Know and Want the Best

REYNOLDS

RED DIAMOND CUSHIONS

FOR FORD CARS

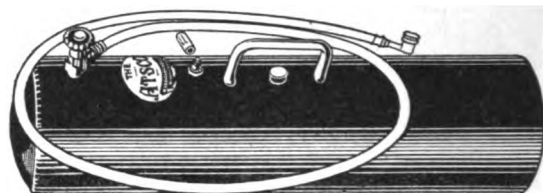
A Perfect Product for Particular People

Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.

Sold thru regular channels only.

Manufacturers
The REYNOLDS SPRING CO.
JACKSON, MICHIGAN

Sales Dept.
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You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.



Pat. 9-19-18.

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on the car equipped with

UNIVERSAL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBER and DEALER—Your profit is liberal.

Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.

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Best for Garage Work Graham Socket Wrenches

Known throughout the automotive industry for their unexcelled strength and reliability. Turned from the best solid bar stock and heat treated.

No. 3 Set, shown herewith, meets the needs of garages and large cars. Eight sockets and handle packed in neat canvas bag.

Get literature and dealer prices.

Graham Roller Bearing Co.
COUDERSPORT, PA.

Price \$2.75



ROSE

GREASE BUCKET

For handling grease conveniently, quickly, without mess or waste, there is no equal to the Rose Fil-A-Gun Grease Bucket. Pumps grease through hose direct to point where needed. Or, one stroke of pump fills the Rose Taper Nozzle Grease Gun with which every Rose Grease Bucket is equipped.

DEALERS: Rose Grease Buckets, like Rose Tire Pumps, will increase your sales and make you good profits. Have your jobber send you complete information.

Frank Rose Mfg. Co.
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SECURITY Display Tire Rack

**Guards Stock
Sells Tires
Saves Space**

Prevents thefts by keeping your tire stock securely locked. Increases sales by displaying tires in an attractive manner.

Write for our special offer.

THE W. J. SMITH CO.

1834 Broadway

ARO

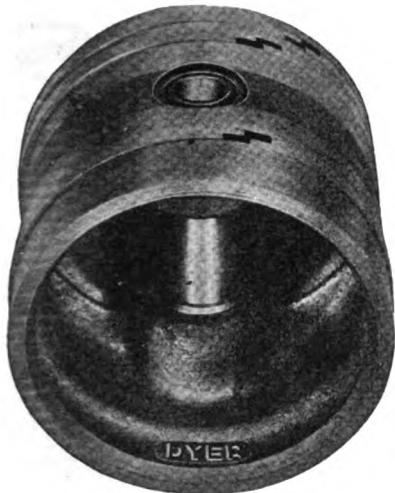
**The Electric Signal
that Prevents Collisions**

Red arrows displayed on the front and rear of the car signal the direction in which it is going. Makes motoring safer and more enjoyable. Your customers will want ARO.

Get our liberal dealer proposition.

PISTONS AND PINS

Finished—Semi-Finished



All Makes and Models of Pleasure Cars, Trucks, Tractors

Automotive and hardware jobbers buy Dyer Pistons because their dealers demand the best. Finished pistons include bushings if so designed. Semi-finished pistons have center grooves standard diameter and pin holes rough reamed with center marks.

LOOK FOR THE NAME

Each Dyer piston is individually packed and marked. Standard and .0025, .005, .010, .015, .020, .025, .031, .035, .040, .045 over-size. Semi-finished Pistons are .062 and Pins .020 over-size.

All Models—All Sizes

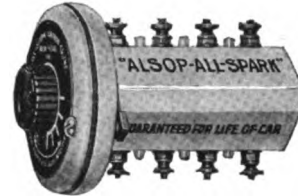
THE DYER COMPANY
CAMBRIDGE, MASS.

Save \$135 a Year on your Ford
Much more on other cars and especially trucks

ALSOP-ALL-SPARK

Is an indispensable part of your car

YOU CANNOT AFFORD TO BE WITHOUT IT
Best by Government Tests. This simple little device does away with spark plug and carbon troubles.



Saves gas, battery, oil, piston rings, repairs, depreciation, no overhauling on the road and many other advantages that spell car satisfaction. Send your order today—Circular on request.

Jobbers—Dealers—Agents Wanted

Cost complete, with money-back guarantee \$7.50

ALL-SPARK IGNITION CO.

13 Water St.

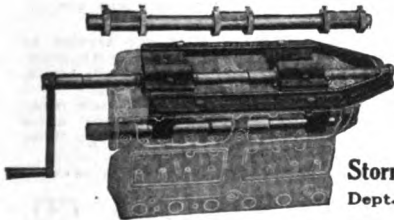
New York City

STORM

MOTOR REPAIR EQUIPMENT

installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.

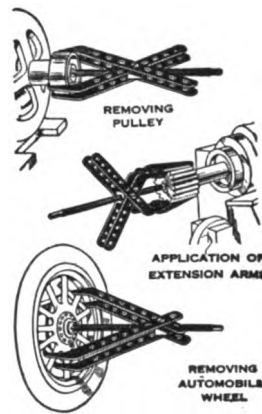
The Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

Storm Manufacturing Company
Dept. E Minneapolis, Minn.



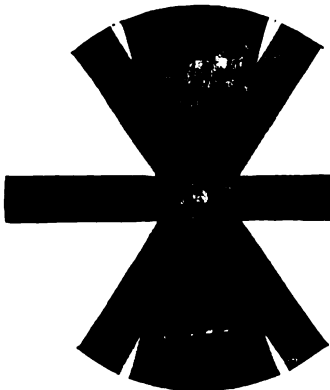
"LITTLE GIANT" GEAR AND WHEEL PULLER

Pulls any gear, wheel or pulley anywhere in a jiffy. Built on the only correct principle. Produces maximum efficiency with minimum effort. Can't twist off or let go. **THE HARDER THE PULL—THE TIGHTER THE GRIP.** Reduces operating cost and increases the earning capacity of any Repair Shop. Made from best grade drop forge steel. Almost unbreakable. Adjustable up to 13 inches diameter. Satisfaction guaranteed or money refunded. Order or write for details today. Price complete with extension arms, \$12.00.

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You Don't Guess the Answer You READ It on the Blade



Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular.
PRICE \$2.50

AM-PE-CO SALES CO.
Marshalltown, Iowa



BURD HIGH COMPRESSION RING CO., Rockford, Illinois

The Garage and Shop Market Place

PISTON **B-N** P I N S

Sta., .003 O. S.

.005 and .010 O. S.

Our Jobbers and Branch Offices listed below can fill orders from stock, upon 24 hours' notice, for any piston pins for any popular passenger car and for most motor trucks. Standard, .003, .005 and .010 oversize carried in stock at all times. Particular attention paid to orders by telegraph. Our May 1 Specification Chart is now ready for distribution. Send for it today.

These Jobbers Stock **B-N** Pins

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Ray Daley, 91 11th Street.....Portland, Oregon
Sunderland Mach. & Supply Co.....Omaha, Nebr.
Liberal Buick Co.....Liberal, Kans.
Sleg Company.....Davenport, Iowa
Midwest Auto Supply Co.....Dubuque, Iowa
Bailey & Co., Inc.....Little Rock, Ark.
Sharp Auto Supply Co.....Oklahoma City, Okla.
Oliver H. Van Horn Co., Inc.....New Orleans, La.
Faeth Company.....Kansas City, Mo.
Beck & Corblitt Iron Co.....St. Louis, Mo.
Cummings & Emerson.....Peoria, Ill.
Fort Wayne Iron Store Co.....Fort Wayne, Ind.

Homer A. Keller Co., Inc., 415 N. Capitol Ave.....Indianapolis, Ind.
Peaslee-Gaubert Company, Incorporated.....Louisville, Ky.
Coful Auto Parts Co.....Cleveland, Ohio
The Julius J. Bantlin Co.....Cincinnati, Ohio
Bailey & Co., Inc.....Atlanta, Ga.
Pasco Tool Company.....Atlanta, Ga.
Hackney Bros., Inc.....Wilson, No. Carolina
Tranter Mfg. Co.....Pittsburgh, Pa.
R & L Bearings Co.....Philadelphia, Pa.
Billingsley Co.....Washington, D. C.
Onondago Auto Supply Co.....Syracuse, New York
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Burgess-Norton Manufacturing Company

516-530 Peyton St., Dept. C, Geneva, Ill.

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402 Nat'l City Bldg., Cleveland, Ohio. Tel. Main 184; Central 1765-R

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Cylinders reground at our Chicago office.

CYLINDER AND CRANKSHAFT GRINDING

New Oversize Pistons, Rings
and Wrist Pins

Highest grade machinery and tool equipment, no makeshift tools. This equipment with our years of experience in the automotive business insures you highest grade work at the hands of experts. Work fully guaranteed. Patterns for all pistons, 25,000 piston rings and 5,000 wrist pins in stock. We are the acknowledged leaders in our line.

Aluminite Pistons and Connecting Rods

put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

Power Plus Cylinder Head for Ford Cars

keeps the motor cool, increases power and speed.

Expert Motor Building and Overhauling

Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

Ask Our Customers

**GREEN ENGINEERING
COMPANY**

S. St. Clair St., Dayton, Ohio

High Grade Standard Makes Tires and Tubes at a Saving of Better Than 60%

New		Tube
30x3	\$7.75	\$1.50
30x3½	8.90	1.75
32x3½	10.50	1.90
31x4	13.00	2.00
32x4	14.00	2.10
33x4	15.00	2.20
34x4	15.25	2.30
32x4½	20.00	2.30
33x4½	20.50	2.40
34x4½	18.50	2.50
35x4½	19.50	2.60
36x4½	20.00	2.75
35x5	20.00	3.00
37x5	21.50	3.00

Mail orders, \$2 deposit with each tire ordered, balance C. O. D., subject to your inspection. A trial order will convince you.

5% off for cash with order.

MOTOR SALVAGE CO.

1602 Michigan Ave., Chicago, Ill.
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If you SELL AUTOMOBILES you can SELL LIFE INSURANCE

Some of our agents cleared above \$10,000 last year. Best territory open. Very liberal contracts. Popular policies. The Farmers National Life has \$1.75 of admitted assets for each dollar of policy liability. Write at once to

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LOWEST PRICES for Good Serviceable PARTS

We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

We make a specialty of our service to the trade and can supply you with practically any parts you want from stock. Orders shipped the day received.

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Index to Advertisements

A		K	
Accurate System & Manifold- ing Co., Inc.	—	Kastons, Henry	—
Adamson Mfg. Co.	59	Kennedy Car Liner & Bag Co.	54
Air-Tight Steel Tank Co.	56	L	
Albertus & Co., F. A.	52	Laminated Shim Co.	7
All-Spark Ignition Co.	57	Leich Electric Co.	49
All-Spring Shock Absorber Mfg. Co.	61	Lewis Tool Co.	—
American Bolt & Screw Case Co.	—	Loudon, Inc.	—
American Valve Tool Mfg. Co.	—	M	
Am-pe-co Sales Co.	57	McDaniel Rubber Co., Leo	—
Atlas Auto Supply Co.	—	Marvel Carburetor Co.	53
Auto Specialties Mfg. Co.	5	Marvel Machinery Co.	3
Automotive Publ. Co.	52	Motor Salvage Co.	58
B		N	
Bailey Co., Geo D.	—	National Cash Register Co.	47
Boddy, J. Newton	52	National Refining Co.	45
Brewer Specialty Corp.	4	National Rubber Filler Co.	—
Brunner Mfg. Co.	62	New Era Spring & Specialty Co.	49
Burd High Compression Ring Co.	57	Northern Trading Corp.	—
Burgess-Norton Mfg. Co.	58	P	
Butler Mfg. Co.	59	Paro, H. G., Co.	—
Butterfield & Co.	55	Peerless Engineering Co.	51
C		Peerless Finishing Co.	—
Catlain, Andre G.	59	Pennypacker Co., The	37
Challenge Battery Co.	56	Phillips, H. E. & Co.	—
Champion Pneumatic Machin- ery Co.	6	Pick & Co., Albert	56
Channon-Hughson Co.	55	Premier Electric Co.	57
Clark Co., W. L.	53	R	
Coffield Tire Protector Co.	—	Reynolds Spring Co.	56
Curran-Detroit Radiator Co.	—	Romort Mfg. Co.	55
Curtis Pneumatic Machinery Co.	35	Rose Mfg. Co., Frank	56
D		R. T. Mfg. & Sales Co.	5
Dearborn Equipment & Hinc- ley-Meyers Co.	—	Rust Products Co.	39
Dickerson, C. A.	54	S	
Duntley, J. W.	—	Shaler Co., C. A.	Front Cover
Dunton Co., The M. W.	—	St. Paul Welding & Mfg. Co.	—
..... Back Cover	—	Sampson Electric Co.	59
Dyer Co., The	57	Sawyer-Weber Tool Mfg. Co.	54
E		Schrader's Son, Inc., A.	52
Eclipse Valve Grinder Co.	53	Silpon Co., The	—
Ever-Tyte Piston Ring Co.	—	Smith Co., The W. J.	56
..... Inside Back Cover	—	States Chemical Co.	8
F		Stiles Mfg. Co.	—
Fairbanks Co.	—	Storm Mfg. Co.	57
Farmers' National Life Insur- ance Co.	58	Sunderland Machinery & Sup- ply Co.	—
Federal Electric Co.	43	T	
Finck & Co., W. M.	—	Tokheim Oil Tank & Pump Co.	—
Flexlume Sign Co.	6	Trindl Co., The	59
Foster Bros. Mfg. Co.	59	Tungsten Mfg. Co.	—
G		U	
Ganschow Co., William	54	U. S. Air Compressor Co.	—
Garden City Spring Works	59	Universal Mfg. & Sales Co.	56
Gem Novelty Co.	—	V	
General Utility Co.	—	Van Trump-Esclbey Co.	51
Globe Mfg. Co.	54	Victory Oil Stove Co.	—
Graham Roller Bearing Co., The	56	W	
Grease Pump Mfg. Co., The	53	Wagner Specialty Co.	59
Greb Co.	61	Warshawsky & Co.	58
Green Engineering Co.	58	Washburn Burner Corp.	—
Greenfield Tap & Die Corp.	41	Webber Co., P. H.	35
Greer College of Motoring	58	Western Rubber Mold Co.	—
H		W. H. S. Mfg. Co.	61
Harvey Spring & Forging Co.	54	Wiggins Co., The John B.	—
Hauck Mfg. Co.	55	Worcester Abrasive Co.	—
Heiser Special Tool Co.	—	..... Inside Front Cover	—
Hicken Sod-Tor-Lite Co., B. E.	59	Z	
Hobart Bros. Co.	—	Zinke Co.	55 and 56
J			
Jenkins Vulcan Springs Co.	33		

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A Greb always will. It's this versatility—ready ability to grip and pull in the almost impossible places—that makes Greb Automatic Grip Pullers so handy for shop equipment. The wire wheel hub which this Greb is forcing off, as shown in the illustration, was stubborn in yielding to any other pressure. And it didn't afford any too much room for leverage. But the Greb, with instantly adjustable jaws, takes hold and hangs on until a few turns of the wrench have taken all the "fight" out of Mr. Hub.

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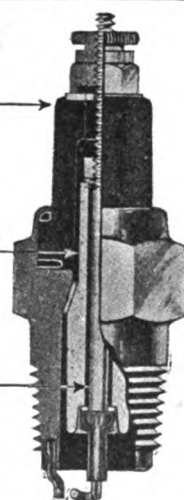
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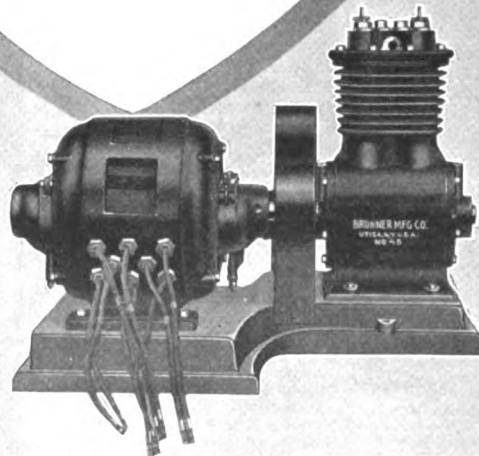
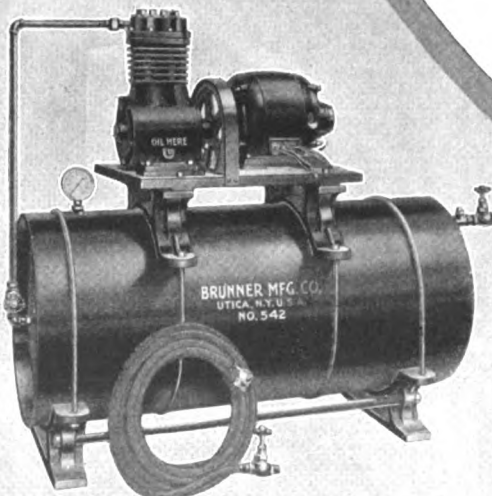
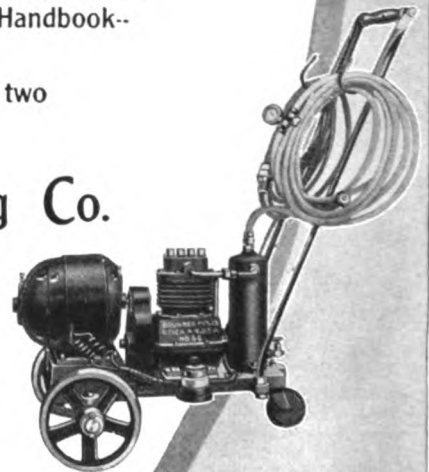
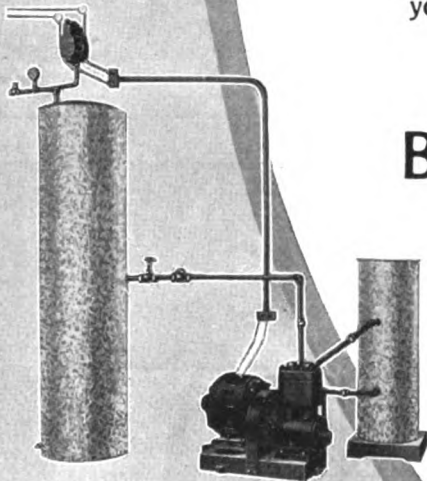
Works: UTICA, N. Y.

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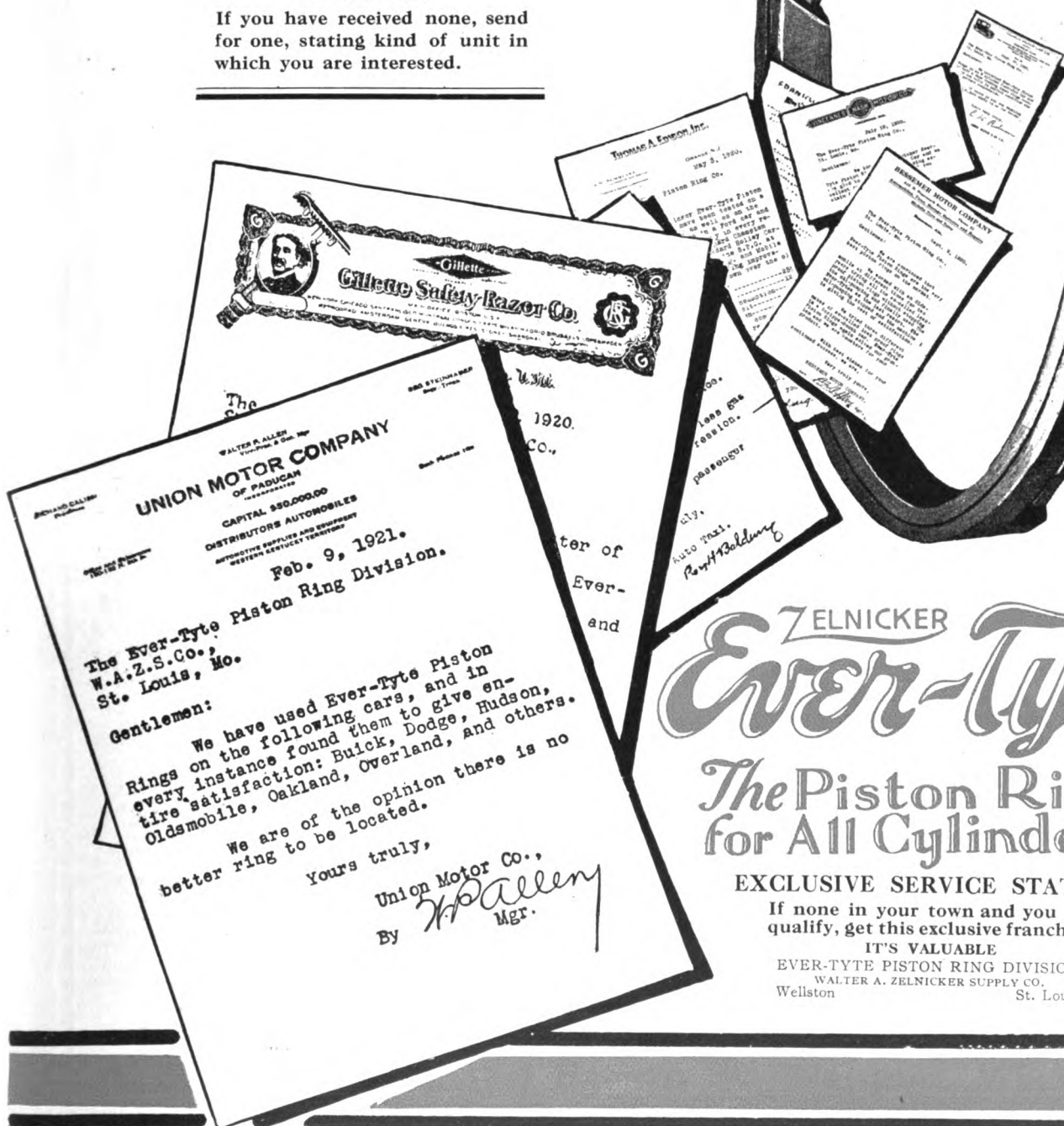




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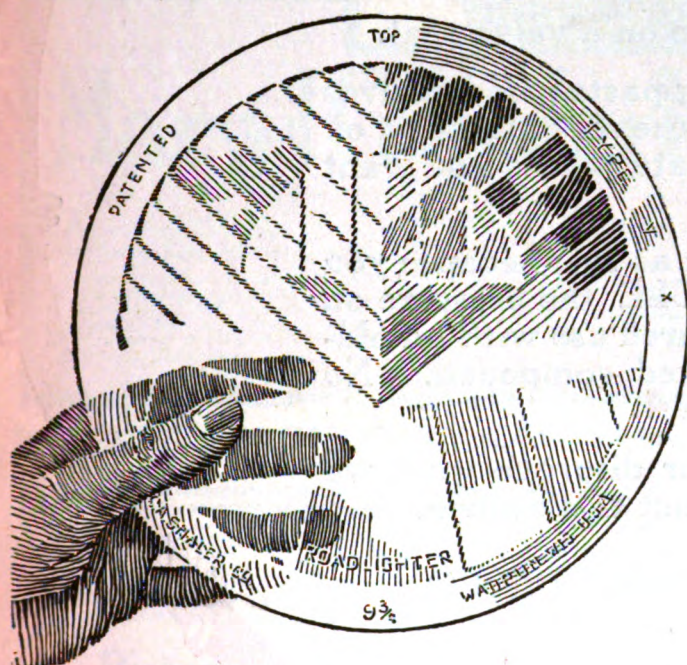
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JUNE, 1921

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Non-Drying
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"PEP" valve grinding paste grinds valves **2** times as fast because it contains no oil nor grease to lubricate where you want friction.

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You cannot prove nor disprove what we claim unless you fill out this coupon.

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FREE

WITH YOUR JOBBER'S O. K.
ON THIS COUPON WE WILL
SEND YOU A SAMPLE CAN OF
PEP FREE

FREE

Your jobber wants to sell you the BEST Grinding Compound, but he is too busy to make a test of every brand. To prove the superiority of "PEP" we are willing to go to the expense of sending you free a can under the following conditions. Clip this coupon and send it to your Jobber with request that he O. K. and forward to us. Also with the understanding that you will report to him the success of your test of "PEP".

(YOUR JOBBER'S O. K. NECESSARY)
(To Your Jobber):

Gentlemen:—We would like to make a test of PEP in accordance with their proposition. Kindly O. K. and forward this coupon to the Worcester Abrasive Co. so that they will send us a can of PEP for testing purposes. I will let you know the results of this test.

JOBBER'S O. K.

Please send the party whose name is written above a trial can of "PEP."

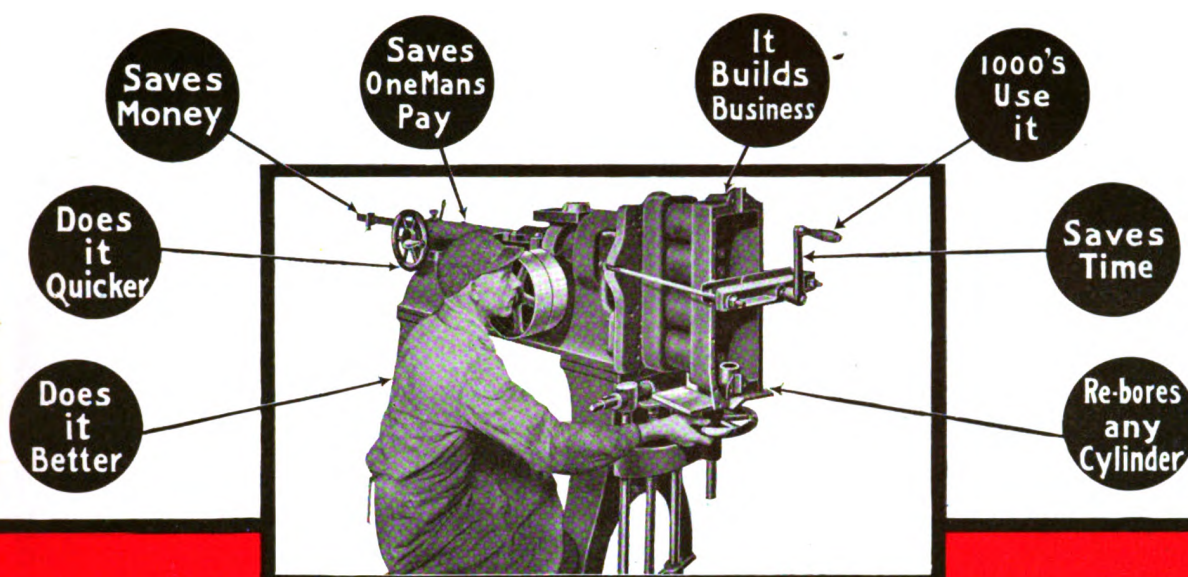


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Marvel Cylinder Re-boring Machine

**Bores Any Cylinder
in Less Time—Less Expense**

Tested in over a thousand shops, vocational schools and technical colleges and now daily boring out profits for owners. Will handle any gas engine cylinder from a motorcycle to a tractor and do it quick. Enables one man to do the work of two. We develop business for you. Ask us.

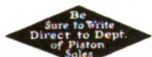
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Read what other practical mechanics say about Marvel Cylinder Re-boring Machines. Learn how repair shops are getting the automobile trade thru the Marvel's ability to do the work, at lower cost to the car owner yet with a bigger profit to the dealer. Write now.

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Made in many types for all automotive requirements.

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American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Action, Not Words.....	9
Plant the Idea.....	9
Reductions Bring Stability.....	9
Today's Demand on Management.....	10
Our Business and Europe.....	10

GENERAL

Get the New Business Spirit! It Pays, by K. H. Lansing	10-12-13
The Boss Has an Acter Try Persy Out, by Frank Farrington	16-17
Liability of Employers to Aliens, by Chesla C. Sherlock	19
The Demand for Headlight Service, by Robert Livingston	20
Pirate Parts—Dealers Avoid Them, by J. N. Bagley	21-22
Glimpses in the Garageman's World.....	25-26
Finds "Golden Rule" Service Profitable.....	31-32

DEPARTMENTS

Accounting, by J. N. Boddy.....	14-15
Welding, Cutting and Brazing Practice, by David Baxter	23-24
Practical Hints for Shop Mechanics.....	27-28
Readers' Questions and Answers.....	29-30
Facts and Ideas for the Tire Dealer.....	36
Accessories—Dealers' Key to Profits.....	38-40-42
Here and There in the Motor World.....	44
Up-to-the-Minute Garage Equipment.....	46-48-50

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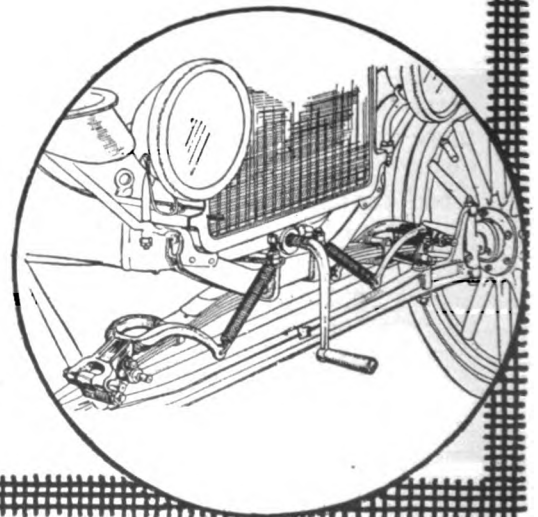
Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

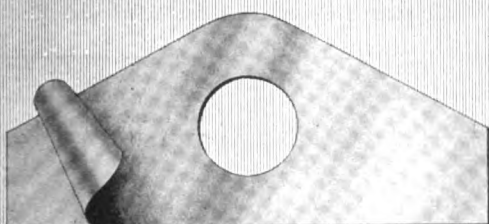
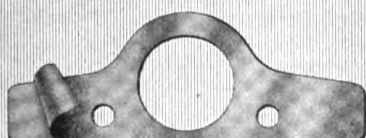
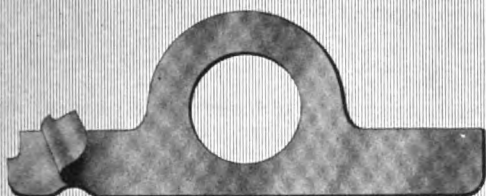
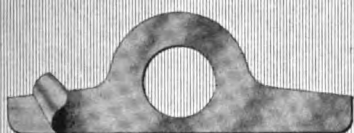
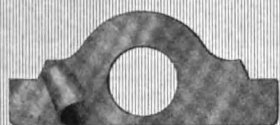
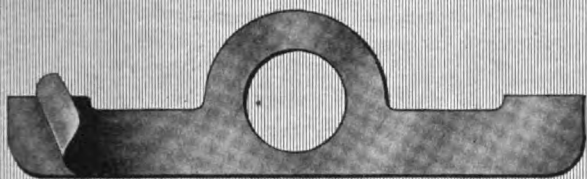
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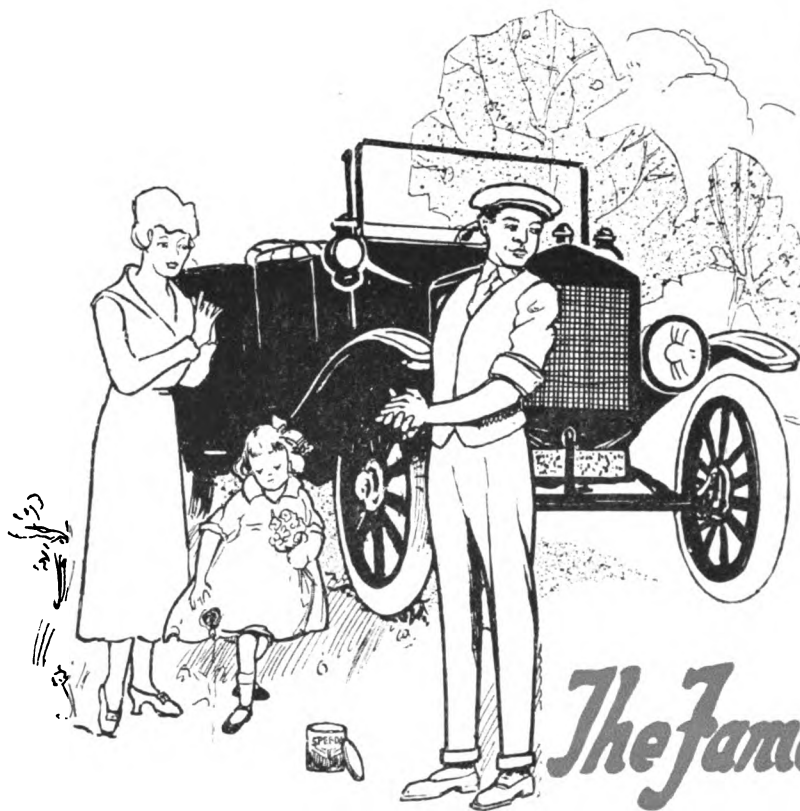
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SPEE-DEE is unexcelled for removing spots from clothing and has many garage and household uses. Your men will prefer it to anything else for cleaning up after those greasy jobs.

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**Write today for full details
and dealer selling helps.**

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SPEE-DEE

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 6.

CHICAGO

June, 1921

Action Not Words.

Wholesale prices, it is declared by those who have made a special study of them, have, with a few exceptions, reached the bottom point. It is expected that the new price levels now reached will probably be stabilized on the present basis.

It has been demonstrated time and again that the public has a great deal of buying power left. Try placing on sale some particular thing at a real bargain price and see how quick the response will be. That is the reason why it is stated over and over again that, when the public is fully convinced that prices have reached a stabilized basis, there will be an end to the so-called "buyers' strike."

Indications are that that time has arrived in the automotive industry. The general reductions in car, truck and tire prices are such as to back up the dealer in his claims that prices are stabilized for this year. Salesmanship will bring in the business. Action now is needed rather than words.

The sales manager of a company which so far this year has beaten its previous records in the sale of cars, declared recently that there never was a time when it is more necessary to get to the bottom of things; to get facts and give instruction to the salesman. If he works along definite lines, he gets results; his confidence returns, and his sales increase.

The smile of self-confidence is the suggestive influence that closes the sales. Let us have less talk about busi-

ness conditions and more intelligent study, more intelligent direction, more concrete work, and more optimism. Find out what is in your prospect's head before you start on him. Analyze facts and find out the people who are able to buy, then go to work on them.

"We are striving for 'enthusiastic customers' for we are not content to

True Service—Our Nation's Greatness Depends Upon It.

We need remember at all times that we are not a nation of machines and houses, factories, and railways. We are a nation of men and women, and children. Our industrial system and our commerce are simply an implement for their comfort and happiness. When we deal with these great problems of economics, let us deal with this one conception—that our object is to defend and increase our standards of living—and upon this soil grow those moral and intellectual forces that make our nation great.—Herbert Hoover.

have merely 'satisfied customers,' " declared this man. His ideas are sound and well worth trying out in these days of building for the future.

Plant the Idea.

"If you are going to sell a man, you've got to get the idea into him," thus declared a man who has had exceptional opportunity to observe and practice selling methods, both from a theoretical and a practical basis.

It is a principle of psychology that impression always gives expression in some form or other. Hence it is neces-

sary for a salesman to align himself consciously with human nature in order to create a favorable impression.

Another principle is that every bit of conscious life is followed by motion; that is, an idea placed in a man's mind becomes an active force and is followed by motion. Plant the idea and he will eventually do what the idea directs.

Furrow, harrow and pulverize the man's mind before planting the appeal just as the farmer prepares his land before planting. Then use the rifle-ball appeal of one idea at a time. Don't spatter with a number of ideas.

Reductions Bring Stability.

In the past month many manufacturers have announced cuts in the prices of cars and trucks. Among those which announced reductions are several companies which were among those that lowered prices last October.

The great surprise was the cut in the prices of the Ford cars, the second since the beginning of the year. This, it is said, is the final reduction to "bed rock" prices. The latest reduction brings the Ford touring car to its second lowest figure in the history of the company. In 1917 it was \$360. In announcing the new reduction, the company said:

"Ford business for April and May was greater by 56,633 cars and trucks than for the same two months in 1920; in fact, the demand has been even greater than the supply, so that our

output has been limited, not by unfilled orders but by manufacturing facilities. During May we produced 101,424 Ford cars and trucks for sale in the United States alone—the biggest month in the history of our company.”

It seems to be the prevailing opinion that the price levels now reached will be maintained throughout the balance of the year. Indeed, some of the manufacturers have issued announcements guaranteeing their present prices until January 1, 1922. Undoubtedly many of the manufacturers have anticipated the lower levels of raw materials and have priced their product on the new basis.

The effect of so many announcements of reductions in prices of cars and trucks within the past few weeks should be good, for they can not help but produce the idea of stability in the minds of the buying public. Those who have been holding off buying a car in the belief that lower prices would prevail should be converted from “live” prospects to buyers.

The slogan at the beginning of the year was “1921 will reward fighters.” Now it is “1921 is rewarding fighters.”

Today's Demand on Management.

Just now business is greatly concerned with management—in fact, the people of the country have been very much interested in management, particularly in the last few years. They became dissatisfied with the management in Washington and installed new management.

So it is in business. If the management does not meet the requirements of the situation according to the ideas of those in control, it is succeeded by another management. In the period since the closing of the war, there have been many changes in management and in the methods of management.

Today the demand on management requires a fundamental change in efficiency, for prior to a year ago an inefficient management could continue in business due to the fact that profits were made that did not depend upon

efficiency in management. The high peak in prices was reached last year after a rise extending over a period of about 25 years. In this period inefficient managements were able to show profits due, largely, to increased values of inventories. Now, these profits are wiped out because of the lessened values of inventories.

The business relationship of this country to the world is different from what it was, for we have changed from a debtor nation to a creditor nation. In other words, where we formerly had an excess of imports over exports, we now have an excess of exports over imports. No longer is the interest of the business confined only to the exporter, for indirectly this new relationship to the world will reach the local business man.

A forerunner of the new methods in business is seen in the discussions at Washington involving the adoption of a budget for governmental operation. Many business concerns are already operating on the budget plan, which involves a tightening all along the line—a keeping track of the pennies before they are spent. Under a budget system, wastes are eliminated, for it necessarily directs attention to expenditures and their necessity.

Those who have studied business declare that methods of distribution must be changed. Distribution will be worked out with lower margins in getting the goods to the consumer at the lowest cost. The retailers will necessarily only carry such goods as move rapidly—those in which the turnover is several times a year.

Briefly these are “today's demand upon management.”

Our Business and Europe.

“What I would like to know,” said the business man who was endeavoring to obtain information on business conditions generally, “is how bankers and economists figure out that our recovery from the present business depression is to a considerable extent dependent upon the conditions in Europe. Lately I have heard that theory set

forth many times but no explanation was given of it. If you can show me the relation I will greatly appreciate it.”

The business man was talking with an executive officer of one of Chicago's largest banks, a man particularly well-informed as to domestic and foreign banking. Said he in reply to this question:

“You have noticed that the government's figures for the past few months have shown a falling off of exports. This is due to the inability of Europe to pay for the things they need over there. Europe owes us roughly about 15 billion dollars, of which 10 billion was loaned by the government during the war.

“It can not pay us in its depreciated currency, because of the existing rates of exchange; it can not pay in gold, for there is not enough gold in the world to pay—and we have most of it; it can not pay in goods, because it can not manufacture them for it can not get the raw materials from us.”

Then he went on to point out that agriculture is the largest single industry in this country and that we are dependent upon the farm for prosperity. The farm production of the country is greater than our requirements. In order for us to have good times the surplus must be marketed. In this marketing, Europe plays an important part, for 42 per cent of our total exports last year went over there.

With the surplus not being shipped to Europe, production here is curtailed; there is more unemployment and people buy less.

In order to export our surplus to Europe, in this banker's opinion, we shall have to arrange for long-term credits based upon fixed assets.

This, in brief, was the banker's reply to the question as to why the business man, even though not engaged in the export business, is greatly concerned in the settlement of affairs in Europe. Some plan must be arranged so that our surplus production may be shipped to Europe and money or its equivalent received for it.

Get the New Business Spirit! It Pays

Two Wide-Awake Jersey Hustlers Prove That Business Is Good for Fighters in 1921—A Novel and Convenient "Home-Built" Tire Rack—Pennsylvania Has a "Fighter" Also Whose Originality Is Bringing in Good Business

By K. H. Lansing

Merchantville, N. J., has a population of approximately 5,000; yet it is remarkable in an automotive way for two reasons. One of these is the Merchantville Auto Co.; the other is Frank E. Swope, originator of methods.

The Merchantville Auto Co. is the authorized Ford dealer for that locality in Burlington county, but operates extensively outside of that immediate territory.

Frank E. Swope is proprietor of the Motor Repair & Service Co., and is happiest when he is doing some new mechanical stunt. He is a typical American mechanic—tall, thoughtful, yet quick-spoken, exceedingly active, and possessing a knack of picking out improved, original ways of doing things that make people ask: "Why didn't somebody think of that before?" That's because the method is so simple—after Swope has blazed the way.

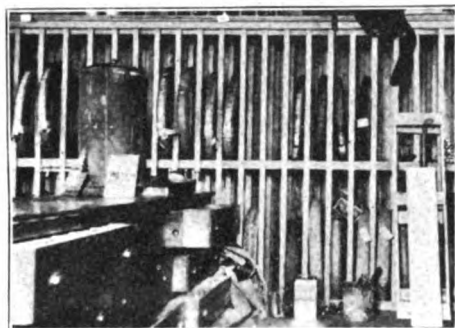
Swope and the Merchantville Auto Co. are in no way connected, except that each is doing a share to place the little town more firmly on the motorists' map.

On West Park avenue, close to the main thoroughfare over which townsfolk and farmers are motoring constantly, the Merchantville Auto Co., occupying a site 50 feet wide by 260 feet deep, offers, in its substantial brick building, all the accommodations a large city sales and service station can afford.

Of course, the company has a full stock of authorized Ford parts. In addition, it operates a garage for both automobile and commercial car storage, having a capacity of about 50 vehicles. It maintains a first-class machine-shop, with expert mechanics, and tools and the smaller machines for bench use.

It has, also, the

usual Ford equipment for servicing and repairing, such as drill press, press for straightening cranks, shafts and axles; connecting-rod aligner; piston and motor clamps; transmission reaming out-



Here's the Surprising "Hen Coop" Tire Rack.

fit; garage vises; running-in and burn-in stand, and grinding wheel.

The cars or trucks which are waiting for repairs, or which have just been finished, are lined up along the wall farthest from the actual working part of the shop. Tractors, likewise, are repaired here, and an adequate quantity of Fordson parts is kept on hand in bins.

The company sells general accessories and tires, being agent for Michelin, Goodyear and Goodrich tires. It does no tire repairing or vulcanizing, but is specializing in putting on tires, for which it has full equipment.

It has a notable "home-built," double-decked wooden tire rack, occupying the entire lower end of the accessory department. The rack is constructed in "hen coop" style, the outer and inner row of uprights being a trifle farther apart than the diameter of the largest tires placed therein, in order to contain them snugly.

Each tire is thus isolated in a narrow "stall" of its own, and is easily and quickly selected and removed without any other tire being disturbed. Care is taken by the stock clerk to place the tires in the rack with the tags outward in plain view.

The company is agent for the Willard battery, and there is a department for charging batteries.

The roomy office is across the garage driveway from the accessory and battery department. There are two large show windows, changed with enough frequency to make them interesting to the passing motorists. The office has a special entrance near the driveway doors, and there are gasoline pumps and free-air tubes on the slightly ramped yard-driveway.

Personal contact with prospects is the forte of the Merchantville Auto Co., according to Manager Carey. He has found it the best policy to make personal calls on possible customers whenever he has an opportunity.

For the last two months, he reports, sales and inquiries have been picking up steadily in automobiles, Ford delivery cars and Fordson tractors. The company is a little new to tractor merchandising, but has been selling its quota and is working on the basis of carefully planned personal calls, which basis is proving most satisfactory as far as it has been pursued.

Prospects are ob-



The Merchantville Auto Co. Believes in Signs.

tained through Mr. Carey's personal acquaintance; satisfied customers who recommend the concern to their friends; chance calls; "stop-ins"; and a system of follow-up letters of the usual type. Many folks from Camden and Philadelphia are numbered among this concern's service and repair customers.

Thus far, the townsman has appeared to be more appreciative of good service, but the Merchantville Auto Co., especially since it has taken on the Fordson tractor, plans to "campaign" until the farmer becomes as appreciative of good service as his city brother.

Through close attention to service and small details in pleasing the customer, the Merchantville Auto Co. has built up a prosperous business. It is not limited by the small population of Merchantville, but is reaching out through the county and beyond.

A few blocks away, Swope has been equally busy in his particular field of servicing and repairing. He is in the constructive stage, and is laying especial stress on short cuts in repair operations.

He has a frame workshop, with an "outdoor annex" for overflow jobs and, because of his closely applied study of how to do a great deal in a short time, rarely finds it necessary to use more than one or two assistants.

Swope's latest stunt to win the ad-

a chain-hoist, in raising the front, the rear, or the "whole shootin' match" of the heaviest truck or automobile, in the minimum of time so that a job may be done on the under side of a vehicle with the maximum of comfort and convenience for the worker.



In the Heart of Tacony—Bolin's Garage.

This stunt, which requires only the ordinary tools that most garagemen already have on hand, is worth, says Swope, at least \$25 a week to him in time and money saved.

Swope had no portable chain-hoist—few of the smaller motor car repair-shops in the little Jersey towns have one—but he had been using a block-and-tackle for lifting passenger cars and trucks so he and his mechanic could work under them. He has a constitutional dislike for a pit, as he says he has always felt uncomfortably stretched and strained while working in one. He would rather sit, or even lie on his back or side while at the job. "A man can't be efficient in a strained position," says Swope.

One day, not long ago, somebody borrowed his block-and-tackle. Before the mechanism was returned, he had a rush order for repairwork that necessitated hoisting the car. After about five minutes' thought, he solved his problem, with the result that he has not used his block-and-tackle for that kind of work since—although it was later returned.

When the rush job arrived, he looked about a little among his tools to get inspiration. There was his "Ranfac" Excel jack, capable of raising a car 18 inches from the ground. Ah! The very thing.

There were also his two sets of steel "blockings," a tube of steel with an edge-like head working vertically within another tube having a triangular base of light structure, the first tube being horizontally perforated at intervals for the insertion of a pin to stabilize the first tube as it was raised, section by section, within the outer tube. The two sets of blockings consisted of a pair to each set in two sizes.

First, by placing his jack beneath the center of the front axle, he raised the front of the car high enough to slip one of the blockings underneath the far side of the axle. Then he put the second blocking in place. Next he worked his jack again at the center, raising the axle.

Then he slipped a pin, first into a higher notch of one blocking and then into the other, keeping this method up—first raising by jack and then by blocking pin—until the front of the vehicle was sufficiently raised. He soon saw that he could raise the car till its top should touch the roof, which would permit him to work at ease underneath the car in a sitting posture, after bringing into play the second or larger-sized set of steel blockings.

Then he had his mechanic assistant work on the rear with jack and blockings, placing the jack, however, under the chassis in front of the spring on the frame, and raising with the block-



The Night Patrol—Bolin's Service Truck.

miration of the local motor car enthusiasts and cause talk about the few machine shops in Merchantville, is the application of his ingenuity in finding a substitute for a block-and-tackle, or



A Well-Equipped Repairshop Is Bolin's.

ings on each side, as in the front, first one and then the other.

He and his mechanic later discovered that, by working together, they could hoist the heaviest truck in only

three minutes, as against an actual hour and a half by the old method.

The handicap, when the block-and-tackle was used, was on account of the time and trouble in making the proper adjustments before starting on the actual hoisting. This included placing the block and so on, in starting and replacing, say, for the rear.

And here is the saving in expense to the garageman who uses this plan, not counting the money saved by quicker action: The steel blockings cost about \$1.75 each, and they can be purchased of any garage supply house. No small garage will require more than six of these blockings, at the outside.

Both the garage jack and blockings together will represent an investment not to exceed \$30. One block-and-tackle of the sort used by Swope, up to the time he tried his "stunt," cost him \$50, and to raise front and rear, or the entire car, in less than an hour and a half after starting in on adjustments, would require a second block-and-tackle or another \$50. And even then the vehicle could be raised in no such time as by the jack-and-blocking method, and held thus satisfactorily.

Swope is now applying his gasoline torch with success to the outside of any metal piece or part that is too tight to be removed except by the greatest exertion. The heat's action quickly expands the metal and permits the release of the tight-fitting part.

Conducting a Ford service station in an industrial suburb of a large city has its peculiarities and its compensations, as C. L. Bolin, the 28-year-old proprietor of a flourishing garage business in Tacony, Pa., an hour's ride from Philadelphia, will tell you.

Young Bolin is the son of a physician, and is a graduate of the mechanical engineering department of Drexel Institute, Philadelphia. He has pitched in with jumper and overalls and, because he is naturally of a mechanical turn of mind, has had first-class training and isn't afraid of axle grease, has built up a prosperous trade in overhauling Ford cars, selling authorized Ford parts, conducting an authorized Ford service station, and is doing a general repair business.

Tacony has only about 18,000 population; largely workers in the big saw, file, and similar plants in the immediate suburb, and textile mill-hands from the adjoining industrial suburb

of Frankford. A very large percentage of these men and boys own Ford and other small cars, many of the machines having been acquired during the war, when wages were at topnotch. Naturally, they are not the slowest and most careful of chauffeurs; hence, the repair business and the sales of parts have been "going strong."

"I have never had to solicit a single repair job since I have been in business," said Bolin. "But I saw to it that I was prepared with the most complete repairshop in town, and when the work began to come in I was ready for any part of it."

Midway between the well-stocked accessory and parts salesroom in front

THESE THINGS HELP BOLIN.

He is specializing in wrecks, looking for collisions at night, and patrolling the streets within a five-mile radius with an especially illuminated service truck.

* * *

To stall through unproductive periods, he sells and repairs batteries; sells automotive equipment and parts; oils, gasoline and greases; is agent for a bicycle; sells passenger cars, truck and bicycle tires and—takes pains to let the public know that he does so.

and the capacious, 30-car garage in the rear, is the repairshop. Its equipment includes portable electric drills, emery grinding wheel, Hauck torches, air compressor, press for straightening frames and axles, and a full complement of bench tools and vises. Even radiator repairing is done here.

Bolin has only one young man to help him—unless there is a rush—in which case he usually can employ an extra man. A singular feature of Bolin's garage is his "den" off the salesroom, furnished like a college student's. Besides a desk, it includes a lounge and a Morris chair.

The repairshop is not only lighted by wide side windows, but has a "greenhouse" skylight which permits daylight operations as long as possible. Storage and service, of course, are on the all-night plan, but the salesroom is closed at 9 p. m. Both passenger and commercial cars of all kinds are stored and serviced, so Bolin had to choose as his assistant a mechanic who knows trucks as well as automobiles.

Tiding Over Dull Periods.

In addition to the departments of his business mentioned, Bolin helps to

tide over the "dull spots" as follows:

He is agent for Exide and Columbia Hot Shot batteries; has a basement shop especially for making battery repairs and doing recharging; is agent for the Rex bicycle; is agent for Fisk tires for passenger and delivery cars, the motor car sizes ranging from 30 by 3 up to 37 by 5; handles Fisk tires for bicycles; and accepts tires for repair from customers merely to accommodate them, not having the repairing done in his shop but letting out the work to a reliable vulcanizer and retreader.

He sells oils, greases and gasoline, having a 550-gallon tank of the latter, with a large pump. As the garage is situated in about the heart of Tacony's main thoroughfare—Longshore street, at Van Dyke street—he gets many "stop-in" customers to whom he supplies free air.

While Bolin, as already mentioned, does not find it necessary to solicit repair jobs of the ordinary sort, he is going hard after the wrecks. Night wrecks are his specialty.

"I have learned that most of the wrecks which occur are caused by collisions at night; at least in the country," said Bolin. "If the wrecks happen at night, that is the time to go after them, while the job is 'young' and before the other fellow gets to it. Then, too, it is real service to pick up the derelict, get it off the street, and start repairing it as soon as possible."

Hunting for Trouble With Lamps.

Accordingly, Bolin has prepared a "night wreck patrol" in his service truck—a ton-and-a-half Maxwell with panel body—with himself as the driver. He is so infatuated with his work of building up trade that he willingly patrols Tacony's streets and adjacent roads in this way, within a five-mile radius, for several hours at night, after his hard work of the day. Sometimes he "cruises about" as far as Frankford.

On his service truck, which he has painted a dark green and whose sides bear advertisements of his garage and the Exide battery, he has mounted a Manley portable crane with a chain-hoist, capable of raising the heaviest motor truck.

For his night-work, with the aid of his mechanic, he has made an illuminated sign like that for a theater, fashioned out of thin sheet iron, and lighted from a battery with small elec-

(Concluded on page 17)

Accounting:

This Month Are Discussed Some of the Record Forms Suited to Garage Accounting and the Books for Recording the Various Types of Business Transactions—Methods of Posting Items to the Several Accounts Involved—A Practical Man's Idea of Garage Accounting—Quiz Questions

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting.

This month, we take up first the use of sales tickets for the purpose of recording transactions and, next, a number of forms which have been found particularly suited to the requirements of the average garage accounting system.

Sales Tickets: If a complete memorandum is made of every transaction when it takes place, and saved, a set of books or a history and analysis of your business can be built up at any time from these memorandums, even though they may have been made on wrapping paper.

However, we wish to have our records as uniform as possible, so we resort to the use of sales slips, sales books, or invoices. As we are in business to sell merchandise or service, the majority of our transactions will be sales. We can use our sales slips, however, to record all other transactions when we have no other original memorandums.

This means that practically all transactions, excepting those with people from whom we buy, will be recorded on sales slips. Sales, charge, and cash received on account and paid-outs in cash may all be shown on sales slips. Check stubs or duplicate checks can be used as memorandums for payments by check.

Invoices and debit and credit mem-

orandums will be your memorandums of transactions with vendors from whom you purchase. It often happens that you wish to make a record of a return of merchandise to the vendor, or to charge him with an allowance or rebate. In such a case, make a memorandum on a sales slip. The important idea is "have an original memorandum for every transaction." Have these memorandums numbered to guard against their loss.

There are four forms of sales tickets commonly in use:

1. Those projected from a sales register, such as made by the American Sales Book Co., Autographic Register Co., or Egly Register Co.

2. Those put up in book form—two, three or more slips to the sheet, original and duplicate perforated, triplicate not perforated—so as to form a journal.

3. The regular invoice duplicate or triplicate, loose or in tabs.

4. The regular duplicate or tripli-
cate sales books.

For general use this last form is preferable, although any of the other forms may be used to advantage under certain conditions.

Duplicating sales books will do, but triplicate books are better. The sales slip should be large enough to permit of sufficient descriptions, but not so

large as to make it inconvenient to carry. A ticket $4\frac{1}{4}$ ins. by 7 ins. will meet the requirements in the majority of cases.

This form of sales ticket is one devised by the writer early in his garage system work and he has since seen no necessity to make any material change in it to meet the requirements of the average garage owner. This memorandum, with your publicity matter printed on the reverse side, is a constant advertisement of your business to all who receive your sales slip.

It is important that this ticket have three columns—price, amount, and cost. The cost column is to be filled in on the copy retained in the office. Again we repeat that these tickets should be numbered, in order that we may be sure that we have them all recorded in our daily business record.

The big advantage of making a memorandum of a transaction when it takes place is the check it gives on your stock. No stock should leave the stockroom, and no job should leave the repairshop, without a proper cash slip showing for it or a properly O. K.'d charge ticket being produced.

This constant and continuous check on your stockroom and repair department will materially help stop the biggest leak in most garage businesses. Charge tickets should be initialed by

[illegible]

This Sheet From the Cash Journal and Bank Register Indicates Method of Entering Expenditures.

however, indispensable in every really efficient bookkeeping system.

If a sales journal and purchase journal are not required, the details of all sales and purchases must be entered in

daily transactions on each and every

[illegible]

the cash journal. When a sales journal, purchase journal or payroll record is used, all that will be shown will be daily postings from these other journals.

All other transactions not posted in these records will be posted direct to the cash journal. For this reason, the details of all cash receipts except cash sales and all cash disbursements will be shown in the cash journal.

Quiz Questions on Garage Accounting.

What is a sales ticket?

What other records besides sales may be kept on sales tickets?

What other forms of original memorandums can you name?

What three items should office copy of sales ticket show?

What size should an invoice or sales ticket be?

When should sales tickets be made out?

How are sales tickets or invoices posted?

What is a cash journal?

What items are entered in the cash journal?

What are the particular advantages of a cash journal over a cash book and separate journals?

What transactions should be shown in detail on the cash journal?

When and where are cash journal amounts posted?

How are postings from miscellaneous columns posted?

The Boss Has an Acter Try Persy Out

Just Set Youre Jaw Hard and Say That Youre Going to Do It and You Will—Youve Got to Treat Customers Rite, I'll Say You Hav Even if They Do Look Like Boalsheveekie—If You Dont Want Enny Frends Act Like Persy

By Frank Farrington

Deer Pete:

I herd a drummer sailsmun in the garaje today saying sumthing about Pinkvill, and when I got a chanse I sed to him that I was from Pinkvill and he sed by golly I diddent look it. Now what did he meen by that Pete?

I got to admit he ment Ime looking more up to dait than a Pinkvill feller mite look but you needent to get peevish about that becaws this drummer sed "Ile tell you what tho theres one live store over there in Pinkvill and thats the drug store and theyve got a yung chap about your size in there thats rite on his job every minnit." That's you, Pete. Say Ile bet youre a good one. Go to it old skout and show thozе Pinkvillains how a drug store ought to be run.

Proibly it aint helpt you enny getting letters from me all the while about a live town like Pike Citty and about a live bizness over here. Hay Pete? If you cant be in a live town its a pretty good thing you got a frend like me that is in one. Well I dont say much about it becaws I dont like a feller thats conseeted.

That drummer is a good feller and he took me to a ball game in the afternoon, and there was 1 man out in the last of the ninth and a man on second and it was Pike Citty to bat and the skore was 5 to 6 in favor of the vissiting teem, and we was pretty exsited or at least I was and then the tale ender on the batting list cum up and he was afrade and he stept back with one foot every time and the pitcher thru one rite at him.

He thought it was going to beene him and he duckt and it out-curvd rite over the pan and that was the seckond

strike. Then he thru anuther and it was a strate one and a hot one, and it just cut the inside corner and the batter was afrade and he jumpt back and he was out. Gee! That left just one chanse to ti the skore and the next batter up was Chuck Magee, and the drummer sed "He wont skare that guy" and he was rite becaws Chuck Magee sure aint afrade of noboddy.



Persy Askt Him What He Wanted and the Old Feller Put His Hand Up to One Ear and Sed "Hay?" Agen and Persy Just Yelld at Him.

The drummer says "Ile bet he hits it" and Chuck stood rite up to the plate and when the first one was a close one by the inside corner, he just mooved back an inch and it was a ball, and then the next one was an out curv and it was anuther ball, and the next one was anuther out and it cum rite over the pan and zowie! Chuck hit er cleer to the fense and made a home run and that made it our game.

The drummer took me to get an ice creem soda and he sed, "Bill did you see the differense in thoze last 2 batters? One was afrade and he fannd and the other had a lot of nerv and a under jaw about like your frend Pete of Pinkvill and he hit er out. Thats the way it goze. If you just set your jaw hard and say youre going to do it, you do it, and if youre skared you dont. Aint it the truth?"

So Pete I gess youre going to get sumwhere all rite and Ive bin looking in the looking glass and I aint got so much under jaw but I can shut it awful hard, and ennyway Ime going to get there whether I hav enny jaw or not and Ile say I aint skared ennyhow. I got too much combativeness for that.

I was saying Ide get even with Persy sum day, but I diddent think it wood

be so soon. Ime even with him all rite but I diddent do ennything to him at that. He did it himself.

A funny looking old geezer cum in yesterdie afternoon and Spike offerd to get him what he wanted, but he diddent want ennything he sed. So we let him alone. He had long hayseed looking whiskirs and youd thought he was a boalsheveekie or sumthing and he just seemd to be looking around to see what a up-to-date gara je was really like.

Then Persy cum in and saw him and begun to laff. Persy had one of his fresh streaks and he says to me on the side, "Whose the rube?" and he diddent say it enny to qwiet eether. I diddent anser a tall and Persy walkt out to where the old feller stood and he sed "Has ennyboddy got you what you want mister?" The man sed "Hay?" Persy askt him agen and then the old feller put his hand up to one eer and sed "Hay?" agen and Persy just yelld it at him.

But it seemd like the feller coodent heer ennything and he just sed, "Ime awful hard of heering so youll haf to excoose me," and Persy sed "Youre an old boalsheveekie and you can go to thunder," only he diddent say thunder Pete. And then the old chap just lookt at Persy kind of funny and walkt out.

Persy was mad and he diddnt care if other fokes around did heer him, and he sed "Theyd ought to keep old fools like that in the old mens home not letting em run around loos."

Bob thought heed hav a littel fun and he sed to Persy "Shush! Diddnt you kno that was Spikes father?" Persy lookt skared for a minnit and then he saw that Spike was grinning and he sed, "O can the commidy. You fellers giv me a pane." And I sed "Mebby he wassent Spikes father but he wassent def eether til you cum in. He herd the rest all rite when they talkt to him."

Persy diddnt kno what to make of that and he shut up and walkt off. Then we forgot about it til this morning. When the boss cum in he told Persy to step into his office.

I coodnt help being rite neer the keehole and heering what they sed becaws the boss spoke loud enuf. He sed to Persy "Youre thru working here. Ive put up with all the idiotic mistakes and ruf stuf from you that I can stand. Heres 2 weeks pay in advance. Be on your way."

Then Persy wanted to kno what heed dun. The boss sed "Youve dun pretty neer everything Ive told you not to do and you havent dun a good stroke for the bizness since you came. The latest, and the thing that makes me say youve got to go, is the way you treeted that customer yesterdie you thought was def. He was an actor I hired to try you out.

"Heez bin in here in one rig or another a good menny times seeing how things go when I aint here, and everything is alwys all rite with everybody but you. You alwys got a bad report and now youre thru and we wont discus it. Ile talk to your mother about it later."

Persy diddnt say enny more, but he cum out muttering sumthing about detective stuf and he went, and he never even sed good by to enny of us. And I hope he never cums back. Well, he never did treet customers rite or ennybuddy else. I aint got a good word to say for him. He got just what was cumming to him becaws he woodnt even try to be a good man.

Buleve me, Pete, if a feller dont want enny frends he can get that way all rite by just acting the way that Persys bin acting ever since Ive bin riting you about him. Now I spoze weel haf to hav a new man on the job here. I gess Ile ask the boss if he

thinks youd do. Then Ide moov up one notch and youd hav my job, hay Pete?

Ile let you kno what the boss says. Mebbby heel say for you to cum and see him. Hope so becaws Ide like to see you ennyhow.

Yours til we meet

BILL

Automotive Industries Occupy Largest Division at Exposition.

The Chicago Boosters' Club, assisted by several hundred of Chicago's business leaders and captains of industry, with characteristic Chicago energy, is pushing forward plans for

Unity and Energy of Action Will Bring Prosperity.

While our recovery may be slower than some may expect, nothing can prevent the prosperity of a country where the people have enlightenment, wish to work, wish to produce, and wish to do right by their neighbors. — Herbert Hoover.

a great exposition to be held on Chicago's magnificent \$5,000,000 municipal pier, July 30 to August 14, 1921, inclusive. The movement is supported by the Chicago Association of Commerce, Illinois Manufacturers' Association, Chicago Automobile Trade Association and numerous other civic and trade bodies.

The automotive division, under the general chairmanship of C. S. Rieman, president of the Elgin Motor Car Corp., assisted by a corps of well known business men as sub-chairmen in charge of passenger car, truck, tractor, airplane, motor boat, motorcycle, tire accessory and lubricating oil sections, will occupy 45,892 square feet of floor space, and is planned to be the most complete and instructive exhibit of automotive products ever brought together under one roof.

The importance of the good roads movement and its bearing upon the welfare of the country will be featured as a part of the automotive division, under the direction of Michael J. Faherty, president of the board of local improvements of the city of Chicago, who is also president of the American Road Builders Association.

Mr. Rieman states that the educational phase of the automotive industries will be prominently featured by means of models illustrating the vari-

ous steps in the progress of transportation, commencing with the cumbersome old two-wheeled ox carts and continuing on up to the modern flying machines. Since historians have pointed out that civilization has never progressed any faster than transportation has advanced, the educational section of the automotive division is expected to attract great interest in educational circles.

Among the several methods that will be used to stimulate attendance is a movement now under way, directed by Tom J. Hay, president of the Chicago Automobile Trade Association, to bring 100,000 automobiles to the Pageant of Progress from outside of Chicago. Assisting Mr. Hay is a committee of 100 men prominent in the automotive industry in Chicago, who are enlisting the co-operation of their salesmen, dealers and friends all over the country.

In enlisting C. S. Rieman, the progressive president of the Elgin Motor Car Corp., to handle the automotive division, the directors of the Pageant of Progress Exposition have insured that this division will be made one of the most interesting and attractive at the show, and that it will be a big factor in stimulating greater activity for the various branches of the automotive industry.

GET THE NEW BUSINESS SPIRIT! IT PAYS.

(Concluded from page 13)

tric bulbs. The sign, perforated in places for wind vents, is set firmly in a wooden frame, three feet by five, and is suspended between the crane and the truck cab and so arranged that it can be taken off or set up in a few seconds.

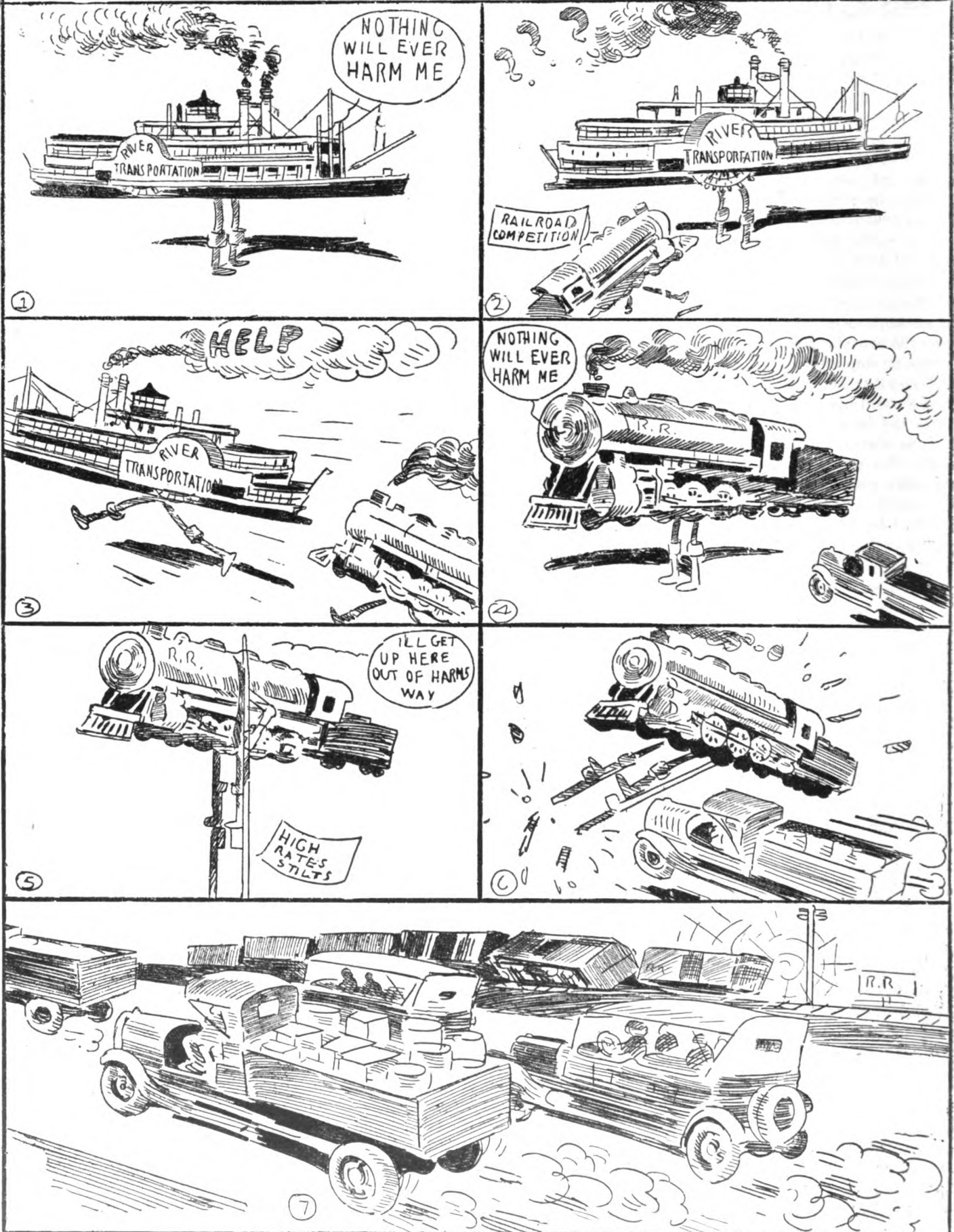
In the truck is the usual service-car allotment of jacks, towing chain, and small tools. An extra large bulb hangs from the end of the crane, like a tail-light. The bulbs on the sign spell out the following legend:

"DON'T CUSS—CALL US!"
"Free Service Car—Takes Care of all—from a Ford to a Seven-Ton Truck."

Then follow the name, address and telephone number of the garage.

Bolin has other ideas "hatching," for he believes, with reason, that occasional "stunts," as well as continuous hard work, help build up garage trade.

TIMES MUTATIONS -



Liability of Employers to Aliens

Have You Any Alien Employees? If So, You Will Be Interested in the Court's Ruling in the Case of Italian Tony—Intention of Statute to Compensate Dependents Whether or Not They Are American Citizens

By Chesla C. Sherlock

Tony Moreno had been working in the Sanderson shop for nearly a year. First, he had been a general utility man, helping here and there as was required in a large and busy shop. He had swept floors, and had acted as "tool getter" and messenger boy between the stockroom and the shop. Then they had put him to washing cars in the service department, and finally he had graduated to the painting department, where he rubbed the old paint off automobile bodies and helped put on the new paint.

Tony was a good worker. In fact, he worked like a horse in the field. He kept his affairs to himself and seemed to be a bit sensitive of the fact that he was "The Dago" of the Sanderson shop. But Tony had a consuming desire to become a mechanic and he chose the only route open to him—the university of hard knocks.

At last the day came when Sanderson asked him to go to work in the shop proper. Tony's joy expressed itself in the gleam of his dark eyes and the smile about his white teeth. "But," cautioned Sanderson, "don't be in too big a hurry, Tony! Take your time. Many a green hand in a shop has gotten hurt because he didn't take the trouble to understand thoroughly the machinery and tools he was working with. There may be bustling life and activity back there, Tony, but there is also grim death around every spinning wheel for the novice."

Tony nodded and went to the shop. Whether it was Fate or not, we do not assume to say, but hardly a week had passed before the caution of the "Boss" turned into grim prophecy. For Tony, in lifting a motor off the chassis one day, in some way misused the tackle and it dumped the heavy engine full upon his chest. In an hour he was a corpse.

Sanderson summoned the boys into the office. "Any of you know anything about Tony?" he demanded. "Anything about his people, his relatives, whether he is a citizen of the United States or not?"

"He's still—or was—a Dago," spoke

up one of the men. "I heard him say something about writing a letter to his wife in Italy yesterday. How the 'great joy' would come to her as it had come to him in being a mechanic."

"Huh!" grunted Sanderson, chewing his cigar, meditatively.

"Nick Salvo was Tony's chum," offered another.

"All right," commanded Sanderson, "you go out and find Nick. I want to talk to him."

The result of the matter was that late in the afternoon Nick Salvo, tremendously hushed and scared, came into Sanderson's office. In spite of his superstitions about the dead, Nick was well educated for a foreigner of the lower class. He was what might be properly termed "a slicker," a sort of small god among his people in the city—what we would term a petty politician or ward heeler. He had a smattering of law, was as cunning as a rat, and ever on the lookout to extend his influence among his brethren.

"I liked Tony," said Sanderson, after a while, "but I do not believe that I am liable to his wife for the payment of compensation under the law. Our statute is silent on the subject of aliens and alien dependents. Since most of the other states specifically mention aliens, some cutting down the allowance due them to one-half, I assume that there is no liability in this state."

Instantly Nick was all business. "You killa Tony—when he worka for you. Then you pay—pay hees woman beeg—or we geta da court to mak you!"

Sanderson's eyebrows lifted. "So? What interest have you in this anyway?"

"Tony my frien'," answered Nick shrewdly.

"All right," agreed Sanderson, with a wave of his hand, "we might as well settle this matter right while we are doing it. Go ahead and petition for compensation. Wiser heads than ours can decide it!"

The case was tried under the proper formalities. In due course of time,

there came to Sanderson, through the mails, a copy of the opinion of the Industrial Commission. Reduced to its simplest terms, that opinion held that Sanderson must pay compensation to the alien widow in the same measure that he was required to pay compensation to a dependent who was a citizen of the United States.

"The defendant employer," read the decision, "will not be permitted to escape the obvious intention of the statute looking towards the compensation of dependents through the assertion of the fact that such dependents are not residents or citizens of this country. The legislative intent is clear that all industrial wastage of life or limb, arising out of and in the course of the employment, shall be compensated by the employer."

"It is pointed out, since other states, or a majority of them, specifically reduce the employer's liability in the case of alien dependents to a sum less than in the case of citizens, that the silence of our own statute may be taken as an inference to include only citizens within its purview."

We can not consent to any such narrow construction of the obvious beneficial and humanitarian intent of the law. To do so would be to legislate a considerable portion of our industrial population outside the pale of the law—certainly a class of people who are most in need, as a rule, of its benefits."

It should be added, however, that one judge was not quite so adverse to Sanderson's position. He wrote a dissenting opinion in which he held that "he would not subscribe to the view that the police power of the state should be used to compel an American employer to divide his property with the alien dependent of a deceased workman, who had never been in this country or contributed anything to our society. It is pure confiscation of property without due process of law."

But Sanderson, like a majority of American employers, had to pay the required amount of compensation to Tony's dependents, nevertheless.

The Demand for Headlight Service

Opportunity for Garages and Service Stations to Cash In on the Demand for Headlight Service—Are You Getting Your Share of This Growing Business?—Instruction Necessary for Bulb Adjustment When Installing Any Lens

By Robert Livingston

The average driver knows less about his headlights than he does about the carburetor on his car. He wants a good light, but has no idea how to even make a start at getting it.

There is a great opportunity for service stations and garages to cash in on the demand for headlight service. It does not require an expensive equipment or technical experts to put you in a position to give your customers a better road light than they have ever dreamed of—and they are willing to pay for it.

Whether or not headlight laws are being enforced in your town, you can build up a very profitable branch of your business by having one or two of your men learn as much about headlights as they know about the other parts of a car.

The reports from various official testing stations scattered over the country show that less than 10 per cent of the cars coming into the stations have their headlights properly adjusted. This means that pretty nearly every car coming into a garage is a candidate for headlight service. Garagemen will find that there is a profit from the service and also an increasing profit from the sale of bulbs, sockets and lenses.

While the light from a headlight with a plain glass lens can be improved by proper adjustment of the bulb and pointing of the headlight itself, it needs something more to get the best light. The plain glass is simply put in the headlight to

good lens is really required to distribute the light properly after it leaves the reflector.

The service man should know enough about the various standard makes of lenses to enable him to give his customer the one which is best suited to his wants. The sure way is to get samples from a few of the reliable manufacturers and try them on your own car, taking care to make headlight and bulb adjustments according to the manufacturer's instructions for each lens. Then you will have a comparison that will let you recommend the right thing to your customers.

While the details of bulb adjustment and provision for pointing the headlights vary on different cars, the general principles on which headlight adjustment and road lighting are based, may be learned by experimenting with the lights on your own car.

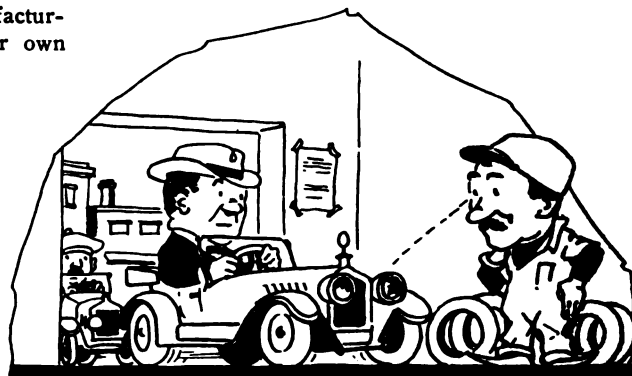
It will be found that a small change in the up and down and sideways pointing of the headlight itself makes a big difference in where the light goes after it gets out a hundred feet from the car. If the headlight tips down, the light will strike the road too near the car, lighting it for only a short distance. If the headlights tip up, they will glare and the light will be wasted on the trees instead of lighting the road. If the headlights point to one side, the ditch or fields will get the light and you will have none on the road.

If the bulb is moved ahead or back in the reflector, when the car is pointed toward a wall you will find that the size of the spot of light on the wall changes as the bulb is moved. You will find that there is one position of the bulb that gives a smaller spot of light than when the bulb is either farther ahead or farther back. This position is called the focus of the reflector.

If you move the bulb back from this point, the spot of light gets larger and the same thing happens when the bulb is moved ahead of the focus. However, when the bulb is back of the focus, the light from

the upper part of the reflector goes to the top of the spot on the wall, and when the bulb is ahead of the focus, the light from the upper part of the reflector goes to the bottom of the spot.

When the bulb is at the focus of the



Nearly Every Car Is a Candidate for Headlight Service.

reflector and the spot of light on the wall is smallest, part of the light from the upper part of the reflector will go to the top of the spot and part of it to the bottom.

From the foregoing, it will be seen that the position of the bulb makes a great deal of difference in the direction of the light after it leaves the reflector. If the bulb is back of the focus, the light from the upper half of the reflector will rise farther above the road as it gets farther from the car. On the other hand, if the bulb is ahead of the focus, the light from the upper half of the reflector will drop toward the road.

All lenses are designed to receive the light at a certain angle and to bend it in a definite direction. Unless the bulb is set at the correct position, the light will not strike the lens at the angle for which it was designed and the lens cannot direct it where it was intended to go. On this account you must have instructions which show the proper bulb adjustment for any lens you install.

While getting a better driving light is largely a matter of common sense and experience to give the necessary "know how," the average driver does not have enough of either to make him do anything except wish for a better light. On this account, the garage or service station that is ready to give headlight service will find that they have added a very profitable department to their business if they will undertake to meet this growing demand. Think it over—the possibilities are there.



Average Driver Does Not Know How to Obtain Better Light.

keep the dirt out. It has no effect on the light so far as directing it is concerned.

The reflector, which is ordinarily used, is efficient in concentrating the light, but aside from throwing the light in the general direction in which it is pointed, it does not distribute the light on the road where it is needed for good driving. A

Pirate Parts—Dealers Avoid Them

People Were Careful to Shun Pirates in the Old Days—They Should Be Equally Vigilant About Pirate Parts Nowadays—User of Pirate Parts Plays Gambler's Game and in Sacrificing Quality for Price Always Loses

By J. N. Bagley

It was just breaking day when we broke camp to continue our journey homeward, for we wanted to end our journey that day. It being Sunday morning, there was not the usual stir in the country and nothing broke the silence except the crowing

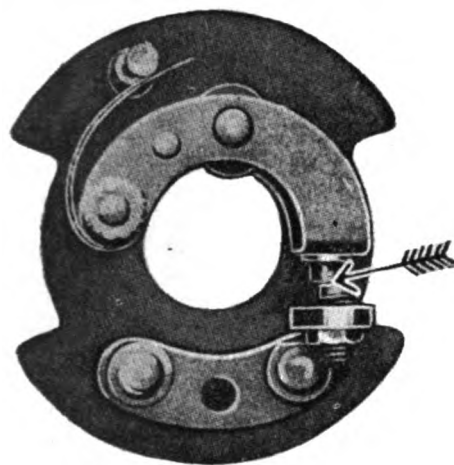


Fig. 1—One Corner of Movable Point Embedded Itself in Stationary One.

roosters as they answered each other from the barnyards in the valley.

The morning was ideal and the roads the best ever. We were sliding down the valley with the speedometer hand playing around 40 miles most of the time and had just dipped down into the low swail to cross the Elm river when we saw, only a short distance ahead, in the middle of the road, a large touring car. Coming to a stop within a few feet of it, we climbed out to ascertain the trouble.

There in the back seat was a broad-shouldered Swede sound asleep. His hands and face were covered with grease and it was very evident that he had been digging into the anatomy of his car.

"Hello," shouted Jack. "Wake up and pay for your night's lodging."

At this the big fellow roused up and rubbed his eyes with his greasy hand and said: "I tank I yust pay for my lodging all right. I work him out yust like workin' my pole tax."

"Any way we can help you? Be glad to do it," returned Jack, smiling at the stranger's greasy face.

"Your on. I tank I like to clean out that garage bunch at Stone Rock Garage who fixed my car, only but yesterday and I get only dis far out and he worse off den when I take him dere."

The garage he referred to was only four or five miles farther on and we offered to

tow him in as it was on our way. He was glad of the chance and tied on to our car. In the course of half an hour we drew up to the Stone Rock Garage where he had had his car fixed the day before. He jumped out of the car and tried the door. No one was about so he started up the street. "Maybe you tank I don't know where I find 'em. Be back soon."

We were in need of gasolene and, besides, were curious and wanted to see what was going to happen. So we just waited the return of the stranger. He was back in about five minutes and had the garageman with him.

The trouble was that a lot of pirate electrical parts had been substituted for genuine and they had failed to work. The stranger had figured this out during the night.

"By Golly! I pay you for the genuine things and you give me someting else what aint no good. I tole you I didn't want none of this monkey bisness stuff yeester-day and ere you yust slip it in and charge for de genuine an say noting. By Golly! you get em out right quick or there vill be some excitement."

The argument continued to grow warmer and finished with a fight. The city "cop" dropped in and took charge. I told Jack that it was time we were moving but we had scarcely climbed in when we were stopped and held as witnesses for the trial set for the next day. We didn't get home that day—just another case of letting our curiosity get the better of us.

Each of the men were fined for fighting and the stranger began suit for damages against the garageman. Again we were subpoenaed as witnesses before we had a chance to get away, so we didn't get home until after the matter was cleared up.

The stranger won out in the end. While the cash the garageman was out did not run into big figures, the fact that he was selling one thing and giving the customer something else, hurt his business. Being a small place, the news of the trouble spread rapidly and many car owners heard of the case.

Six months later I happened to be traveling in a certain county and stopped at a garage to have a jam belt put on my car. When the mechanic came out to put the belt on, I knew at once that I had seen him some place but I couldn't tell just where. When I paid him, I told him that I should know him for his face looked familiar.

"I know who you are. You are one of the fellows who hauled that stranger into

my place one Sunday morning over at C—."

He then told me the story of his ups and downs after that time. His business began to drop off until he didn't have enough to pay his rent. He got rid of every pirate part he had in stock and advertised the fact. But business did not come back so he sold out at a loss and moved to the little town of J—, a distance of 150 miles, and started anew in the same business.

He invited me to come into his place and look his stock over. He had a nice new stock of accessories and repairs—and every single item in it was genuine. He told me that he would not stock pirate parts if he could have them for nothing. He also went on to say that he did not realize there was such a difference until he had tried both and compared results after service had been the test.

Only a short time ago, while driving through the country, the writer stopped at a large garage to have a nut taken out of the engine. After the mechanic had diagnosed the trouble, he pronounced the case curable with a new breaker arm which he said he would supply for a certain sum of money.

Back in olden days when we used to have dash vibrating coils and magnetos, etc., I

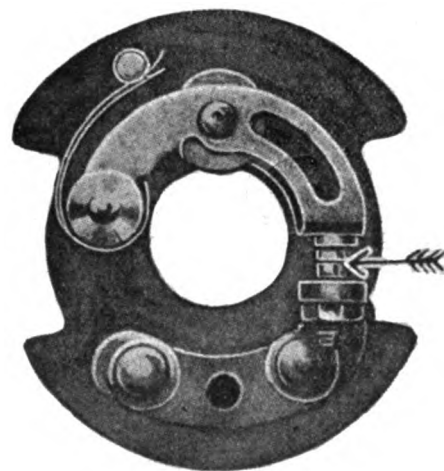


Fig. 2—"I Got the Old Part Out and Compared Them."

had much experience with contact points which were usually made of platinum. Many times pirate points were substituted for the genuine and after the car had run a short time the points would burn and corrode and quite often quit working entirely.

This all came fresh to my mind at this

time, so I asked the mechanic if his parts were the genuine parts and he advised me that they were. Later I came for my car and started on my way. Everything seemed to work well and continued so for about 50 or 75 miles when the engine began to miss occasionally. As time went on, it continued to grow worse and after a little while stopped all together.

Being some distance from town, I decided to take the case in hand and if possible doctor it up until I could get in. The engine acted just about like it should, so I at once dug into the breaker box thinking possibly something had worked loose.

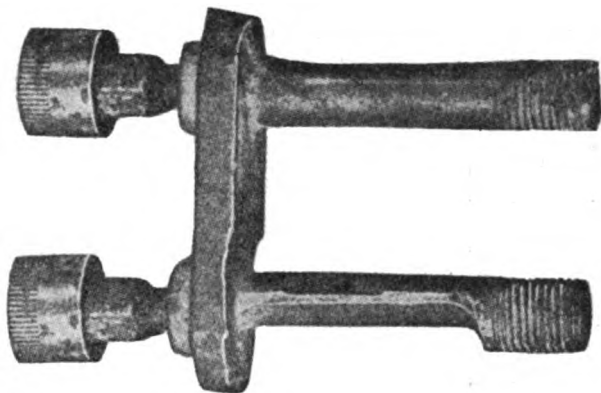


Fig. 3—The Bolts Were Short and Had Worn.

I removed the breaker arm and took a squint at the points and found them black and badly burned. Then I removed the bar entirely and found the points did not line up at all and one corner of the moveable point had imbedded itself in the stationary one, Fig. 1. I got the old part, Fig. 2, out of the tool box and compared them. (The mechanic wanted to keep the old one and would have had I not insisted that I keep it.) I found that the part put in was not the genuine at all.

After filing the points bright and lining up the arms as best I could with the tools I had at hand, I managed to get to a service station and called the mechanic out. He told me that I would have to get another new bar as he could not do anything with the pirate one; besides he wouldn't want to even though he could, for he always guaranteed his work and this he couldn't do and use imitation parts, as he called them.

After the new bar was installed everything went smoothly and I found no more trouble. Some of these days though, I will return to the garage which installed the pirate breaker bar and that kind fellow will refund my money and take the breaker bar which he substituted for genuine—that is, if he is still in business.

Car owner, car dealer or service man cannot afford to monkey with bogus stuff which spells trouble and more trouble. If he does, it's three to one he will eventually go out of business—and he won't retire either.

Since that day I have watched pretty

closely every part that has been put into my car to see that no more pirate parts were slipped in. One day another garageman slipped one over on me in putting in some new spring shackle bolts. It was such a little thing, though, I didn't think of getting anything but the genuine and didn't give the matter a thought.

When I came for my car I paid the bill without question and went on my way, thinking nothing more about it until about a week later when I was filling the grease cups and I noticed that these two would not take grease. After removing them and cleaning them up, I found that there was no hole leading from the cup for the grease to reach the bushing. I also found that the bolts were soft and had worn, as shown in Fig. 3, in the short time that these had been used. Just then a neighbor came along and I showed him the bolts and the story of my experience with pirate parts brought one from him.

He had had a connecting-rod put in a car. A pirate rod was substituted for the genuine and it thrashed out before he reached his home—a distance of 11½ miles.

When he went back, the garageman had a thousand things in mind to tell him that caused it and would not replace the part without a repetition of the price. He took his car over to another garage and the mechanic after taking the engine down told him that the rod was not the genuine but a pirate that could be purchased for about one-half the price of the genuine. The bearing metal used was of a very low grade and would not stand up.

This fellow who sold pirate connecting-rods is not in business just now. He is running an eating house in a little town 25 miles away. I expect he is serving chalk and water for milk just as he served pirate parts for genuine parts. If he is, the chances are that he will be fishing for a living next.

On one other occasion I stopped at the roadside to inquire the way of a farmer who was greasing up his tractor and putting on a few little parts, among which was a new grease cup. When he filled it with grease and attempted to screw it down he had what you see in Fig. 4. When the cup was started on and a little pressure was applied, the threads were cut so shallow that the cup stripped what threads there were and the grease backed

out around. Judging from some of the things he said, I think he was not a Sunday School teacher or else he just forgot himself for the time being.

All other cups on the machine were stamped with the trademark of the manufacturer of the machine but this one was stamped "nothing"—and nothing was what he got.

"Well," he began, "It is no one's fault but my own. I thought ten cents was worth saving as the cup was worth ten cents less than the cup offered by the dealer who sold the machine. Instead of being ten cents cheaper, it will be three or four times higher, for now I will have to go and buy the other cup and give this one to the ladies for their bazaar next Saturday."

"It doesn't pay," in the long run to sacrifice quality for price. It's a gamble and while something may be gained one time, the next ten times will be the reverse, and both money and customers will be lost.

The manufacturer making genuine parts sells them just as close as it is possible to sell and keep up the quality for which his house stands. When some one sells something to replace the genuine that is supposed to be as good there is but one answer: "It is not." The man who expects to stay in business and hold his trade year in and year out cannot speculate and take the chance for the little difference in cost. Experience is a mighty good teacher but a little high in price for the most of us.

From what I have observed over the country, there isn't even a gambler's chance with pirate parts. The man who plays the game may win for a time but in the end he loses. The only thing he can boast of are dissatisfied customers, failing prestige, and a questionable reputation in the community in which he lives. The man who succeeds is the man who plays the game square with himself and his trade.

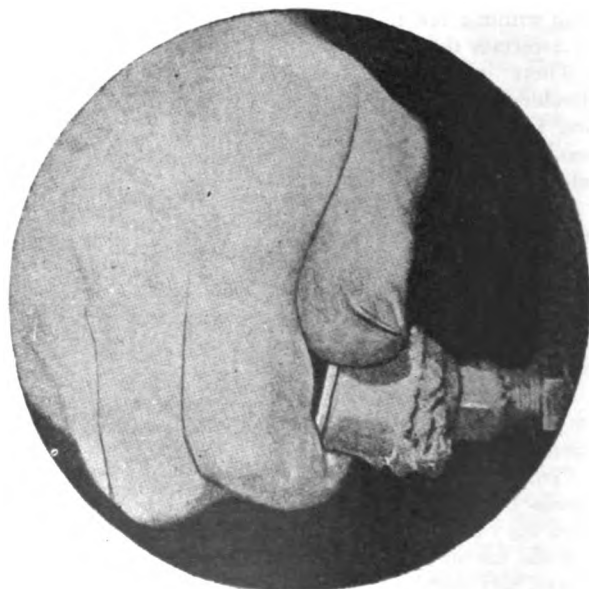


Fig. 4—The New Cup Stripped the Threads and Grease Backed Out Around.

Welding, Cutting and Brazing Practice

Generalities in Connecting-Rod Welding as Related to the Three Kinds of Metal—Specific Examples Showing How Details of Repairing Are Worked Out—Filler Rod Used to Give Pleasing Appearance to the Surplus Metal

By David Baxter

Among many automobile parts which the oxy-acetylene torch welder can repair is the engine connecting-rod. In fact, this is one part of an automobile engine that can be repaired only by a welder, either gas or electric, whether the fracture be located in one of the bearings or in any part of the arm.

The gas welder has the advantage in some cases because some connecting-rods are made of brass and some are made of malleable cast, although the majority are probably made of forged steel. As yet, the electric process is not entirely successful on bronze and malleable.

The oxy-acetylene welder finds either kind quite easy after he learns to handle the different metals. No matter where the fracture is located, nor what kind of metal is in the rod, this welder can repair broken connecting-rods the same as other parts of the car.

First, he learns the peculiarities of each of the three metals in regard to their action under the welding flame. Then he learns the proper filler metal for each, and how to apply it. These items, in connection with a clear understanding of the welding apparatus, should enable the average torch operator to mend any kind of connecting-rods.

Let us first discuss the generalities in connecting-rod welding in relation to the three kinds of metal, and then take a specific example and see how the details of the repairing work out. First, the forged rod: In this the welder should learn the characteristics of this kind of steel in relation to torch and filler manipulation.

This metal is easily oxidized or burned; therefore, the welder must be careful how he applies the welding flame.

It must not be held motionless over any portion of the weld for long, particularly if the point of the flame is almost touching the molten metal. And more especially if the flame is carrying even a slight excess of oxygen, for it is the oxygen that does the harm. The excess oxygen of the flame, and also the oxygen of the atmosphere, is absorbed by the melting steel to change part of the metal to oxide.

If the oxygen is injected into the molten metal by the force of the flame, then the oxidization will be more extensive and deeper seated. On the other hand, if the flame doesn't have sufficient oxygen, or has too much acetylene, it will cause the steel to harden and become brittle. This condition is aggravated by a too close application of the flame, especially if the flame

is held motionless. The carbon, in which the acetylene is rich, is absorbed by the molten metal to change the nature of the steel.

Both of these effects are a detriment to the weld, in proportion to the extent of their application. So that, when welding connecting-rods, they should be guarded against, since this is one part of a car which particularly requires strength. A badly carbonized or an oxidized weld is



Fig. 1—Both Parts of the Fracture Are Beveled to a Blunt Wedge.

weak and, therefore, poor for connecting-rods.

The elimination, or at least the minimizing of these evils, is achieved by a skillful manipulation of the flame and filler rod; provided, of course, that the flame is correct and that the proper filler metal is employed. There are several more minor details, but we will take them up farther on.

Next, let us see what the characteristics of malleable iron are, so in the event we are called upon to mend a connecting-rod made of malleable, we will know the chief obstacles to be overcome. Perhaps it is necessary to mention but one, however, since this one effectually blocks the welding system, for it must be admitted right at the start that malleable cast can not be successfully welded by the fusion process.

When this metal is melted, it turns to a whitish, worthless metal, almost as brittle as glass. It is so lacking in strength that it is useless to weld it, especially for any-

thing requiring as much strength as a connecting-rod. In fact, a malleable weld will often break with a light tap of a hammer.

What is the use of discussing malleable any further then? Because it can be mended with the welding torch, but the process is not fusion welding in the strict sense of the word. Broken malleable castings are brazed instead of welded because it is not necessary to melt the malleable in order to make a brazed joint. This does away with the brittleness.

Bronze is piled up along the fracture as a reinforcement, instead of trying to fuse the two sides of the break into one piece. Sometimes the casting is such that it can not be brazed with surplus metal along the fracture, in which event the edges of the break should be beveled to form a wide V-groove the full length of the break. In fact, nearly all malleable jobs should be grooved, but this is governed by the thickness of the casting about the same as cast iron or other metals.

It is better, too, to groove both sides of the casting, as this will permit a stronger joint. Two grooves offer more surface for the adhesion of the brazing metal. For a brazed joint is merely an adhesion, and differs from a true fusion weld considerably. Brazing on opposite sides of the casting furnishes almost double strength to the job, especially if the brazed metal must be machined off, such as where a braze is made in a bearing surface.

In brazing malleable connecting-rods, the flame is played back and forth along the grooved fracture until the surface is heated to a red stage. Some welders make it bright red, while others raise the heat to very near the melting point before applying the molten bronze. Still others recommend that the surface of the malleable casting be melted very slightly.

It is questionable which method is the best, so it would seem that somewhere between the two extremes would be safe at least. That is, the average welder would probably be safe in heating the V-groove to a very bright red; close to the melting stage. If he does melt the surface, he should be careful that only an extremely thin skin is melted. The deeper he melts, the more brittle will the bond be, and the less chance there will be for the bronze to pull out.

The flame is played over the malleable, then, until the surface is bright red. As this condition approaches, the bronze filler rod is brought close to the outer flame in order that it may be heating.

When the groove is right, the filler is moved in contact with the flame and casting surface. A quantity of the rod is melted and spread out over the bright red groove. The rod is kept in contact and fed into the groove constantly. As it spreads



Fig. 2—Spot-Welding While Holding the Broken Parts in a Vise.

out and then piles up, the force of the flame is utilized to guide and make smooth the surplus bronze, which forms a reinforcement along the fracture.

A good grade of flux powder should always be used when brazing malleable. It is liberally applied at frequent intervals during the melting of the filler. A quantity of the powder is carried to the melting bronze by the heated end of the rod. When it is deposited, it melts and spreads out over the molten metal to protect it from oxidization.

Brass connecting-rod fractures are filled in much the same way that malleable rods are brazed. However, brass connecting-rods are mended by fusion welding and are not merely brazed. That is, the metal in the groove is melted about like any weld, and the filler brass is added to and mixed with it. The filler brass, or bronze, does not merely adhere to the surface but becomes a part of the casting. Very little surplus filler is used—about the same amount as for cast iron welds.

We have now covered the main factors of the welding torch process, as it applies to the three kinds of connecting-rods. Let us take the specific examples, as shown in the illustrations, and see how the details of the procedure were worked out.

The illustrations show a drop-forged rod broken near the center through trying to straighten it. The rod was jammed in the crank-case and badly bent. Then a mechanic tried to straighten it cold, which resulted in the fracture. Before commencing any of the welding process, therefore, the bent portion of each part was heated red-hot and made straight with a hammer.

The first step of the welding process was to bevel each of the broken ends on both sides of the rod. This was accomplished

by grinding the broken ends on an emery wheel. Each end was ground to a blunt wedge, as shown in Fig. 1. Just enough of the break was left in the center to serve as a guide in fitting the parts together in correct alignment.

To secure this alignment the rod was fastened in a vise, while the two pieces were tacked or spot-welded together. This is indicated in Fig. 2. One edge of the rod was tacked, and then the connecting-rod was quickly taken out of the vise and turned over to bring the opposite edge upward. This side was then tacked in the same way.

A medium-sized torch tip and a quarter-inch filler rod were used to tack the parts together, and also to complete the weld later on. No flux was used either in the tacking or in the main weld. A strictly neutral welding flame was employed in both instances.

The medium-sized tip furnished a flame powerful enough to melt quickly without danger of burning the steel, unless held too long over one part of the weld. At the same time, enough heat is furnished to supplant any drawn by conduction to the colder portions of the connecting-rod. Also, enough heat is supplied to melt the proper amount of filler. A large flame would have made the weld metal wild and difficult to control, as well as greatly augmenting the danger of burning the steel. A small flame, on the other hand, would not have furnished enough heat to keep the groove molten and replace loss of heat by conduction.

The spot-welding was accomplished by applying the flame to both edges of the



Fig. 3—Welding the V-Grooves.

break, revolving in a gradually decreasing circle as the steel melted. The flame circles were concentrated in a small spot, until the edges of the fractures were melted and joined.

A drop of filler steel was then added

from the rod which had been brought close to the flame when it was first applied to the spot-weld. This drop of filler was deposited with a twisting movement of the rod; and was blown smooth by the force of the flame. Both spot-welds were made



Fig. 4—Welding the Crank-end of a Small Connecting Rod.

in the same manner, joining the broken parts firmly together.

After the spot-welds were made in this manner and had cooled sufficiently so that there was no danger of sagging or warping, the connecting-rod was taken out of the vise and arranged for the main weld. No preparation was made for heating previous to the welding, since the fracture was not heavy enough to require pre-heating in order to facilitate the fusion, and there was no danger of cracking due to contraction.

The welding flame would furnish heat enough to complete the fusion without heating by other means. The danger of distortion or cracking was eliminated by the nature of the steel, and by the location of the weld, permitting the expansion to push the parts of the connecting-rod outward. This same freedom of action permitted the contraction to pull the parts inward as the weld cooled.

If the connecting-rod had been thick and heavy, like some of the large tractor rods, it would have been a good idea to heat about six inches on each side of the fracture, in order to make the steel melt faster and easier under the welding flame.

This heating would have been done by means other than the torch flame, and would have been maintained during the welding process. Although the heating would have been no more essential, on account of expansion and contraction, than on the small connecting-rod.

Therefore, the rod was merely placed flat upon the leveling plate of the welding table, after taking it out of the vise. This is illustrated in Fig. 3, which also shows the welding in operation. The spot-welds on either side of the connecting-rod prevented mis-alignment endwise or edgewise. If it sagged a little in making the first weld, it could be easily straightened with

(Concluded on page 36.)

Glimpses in the Garageman's World

Originality and a Capacity for Hard Work Bring Big Business to One California Girl—Los Angeles Battery Concern Has Unusual Method for Handling Service That Pleases Customers—A Boat That is Never "At Sea"

Girl Wins Place in Motor Business.

One afternoon a girl, still in her twenties, entered the office of the business man who controls the agencies for a certain automobile on the southern Pacific Coast. She was armed with a letter from a banker,



This Service Station Has a Busy Soda Fountain and Candy Counter.

and she was after the agency for that automobile in her town, Fullerton, Calif.

After reading the letter, the business man looked at her, decided that she was of the "right stuff," and proceeded to extend to her the agency.

"We can let you have the agency for the car in Fullerton," he said. "Now, the best way for you to begin is to take one car at a time. Get in a car, sell that; then get another. You see how that will work?"

"But that isn't the way I wish to start," objected that girl. "I want to get them in carload lots. I'll sell them." Then she proceeded to let that agent understand that she was not trifling with the agency. She meant business. He let her have the agency on her plan. He is glad he did, no doubt, for the girl, Miss Lillian E. Yaeger, sold 125 carloads of that car and over 50 cars of another make in a year!

With Miss Yaeger it was not a matter of any doubt at all. She knew she could sell the cars. She had begun to sell those cars when but eleven years of age. She was not selling cars then; but she was preparing to sell cars. She never had an idea then that there was such a thing as a \$75,000 building—but her business has grown so large that she is in a brand new \$75,000 building now.

When she was eleven years old, she began working in a candy store—not looking pretty and serving refreshments and sacking candies. She did that; but, before she was out of her teens, she made candies, made ices, watched the buying, the accounts, and a number of other things that little girls usually do not worry about and leave to the proprietor. She could run that store

whether the proprietor was on hand or not—and it never gave her one speck of worry. She just naturally picked up one detail of the business after another.

Later she wanted to get into a business of her own. She wanted to do things entirely as she pleased and to get the entire reward for using her brain and brawn. She was quick to use the one and not lacking in or sparing of the other.

"The only business that I could find was a little bicycle repairshop," she said. "I always liked machinery, was always strong, and curious to know how things were made and why; so I bought the little shop. There was not to exceed \$75 worth of merchandise in the place. I had to do all of the work myself, but I never cared and was never stumped."

Following a growth in the little shop, Miss Yaeger saw that there was a limit to that business. Automobiles were growing at a more rapid rate, so she switched to a garage. That meant work not only for herself but for a man whom she employed. Not that she was lacking in ability, for she can take any of the cars apart and have a place for all of the parts when she assembles them again. The garage business grew right along, as did the bicycle shop. People came to have confidence in her and business men took an interest in her success.

She was not satisfied when she found that her business was steaming along handsomely. It appeared to her that the avenue to make money in that field was not in the repairing end of it, but in the selling of the new cars. She told a banker so.

He had watched her industry and determination to get to the top of every venture. He dictated a letter to the agent for the automobile she wanted to handle. He did not want that agent to think that, just because she was a girl, she was lacking in ability or promise of success—there is no likelihood that the agent would, once Miss Yaeger had an opportunity to talk to him.

At one of the prominent corners, Miss Yaeger's establishment was built. She went over every detail of the construction, adding some features that her inventiveness suggested. She was not content to accept plans on mere generalities.

One feature of her plan is the oil station that sets in the angle of the building. This not only brings in revenue from the oil and gasoline, but extra money besides, for she has equipped it with a soda fountain and candy stock. It thus increases the average sale, thanks to her ability to use her imagination. Over 20 men are employed in the plant.

Gives Service They Like.

The very first contact of patrons with the Western Auto-Electric Corp., Hope and West Sixteenth Streets, Los Angeles, Calif., is one that gives them a feeling of confidence and satisfaction. If there are any features available or inventable, that will give better service, this battery concern is eager to get them installed.

"Just wait here a few minutes, and I'll see if I can find a fellow to take care of you," is not the greeting to the customer as he pulls up his car inside the entrance of this establishment.

Heeding a sign "Entrance" after having passed by the doorway marked "Exit," he drives in to where a smiling and very courteous member of the staff greets him. In his hand he carries a tab of forms.

"What will it be today?"

And he time-stamps the topmost form on the pad.

"Battery test."

He then checks the proper item on the form, the clearance sheet that sees the customer through the plant, and gives the office the required information. He then turns to two boards before him. The upper signal board shows numbers for all stalls that are not occupied. To one of these unoccupied stalls the customer is sent—No. 21, for instance.

As the customer starts, the "steerer" notes the board below. There is a number on this board for each of the stalls, from 1 to 82. Under each number there are three push buttons. Each operates a light of one of



Colored Lights Show Stalls Occupied and Service Required.

three colors on the large signal board at one side of the entranceway.

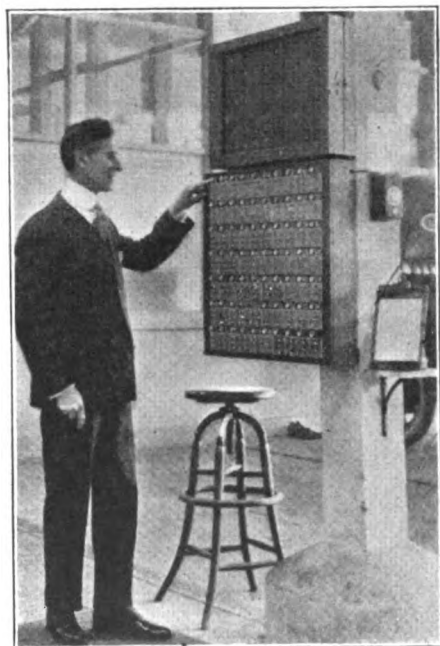
The customer is on his way to stall No. 21, and wishes a battery test. The "steerer," therefore, refers to the uppermost button under No. 21 on his keyboard. Pressing this, he turns on a red light under No. 21 on the large wall indicator-board.

Opposite this wall indicator-board is the "service dispatcher's" cage. He glances at the board and jots down the number in its order after others that have been signaled to him. He then knows what sort of man is wanted next and where he is to be sent—the red light indicates a battery test. A green light would have indicated battery service and an amber, electrical service.

He thus dispatches the men to the best possible advantage without leaving the office and to the satisfaction of his customers. In the meantime, on the upper board of the "steerer," stall No. 21 shows blank, and he knows he is not to send a future customer there. When a worker reaches the customer, he releases the light signal on the indicator-board.

An absence of customers running about or complaining, or of employees giving irregular attention to patrons is the result.

A very clever outfit was made by the shop for its electrical men. This consists of a little cabinet fitted with drawers and shelves and casters. It is easily rolled about the floor to such places as the men are called, and saves the carrying of kits or the



"Steerer" Signals Service to Dispatcher and Workers.

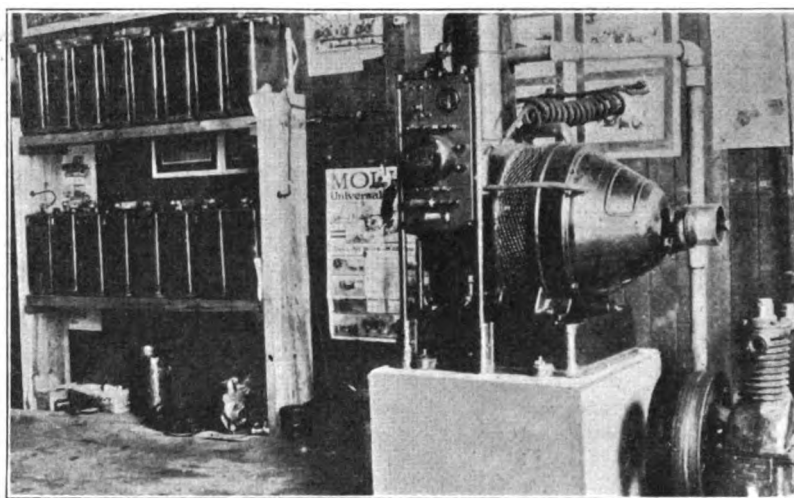
running back and forth for tools or materials.

Each day the firm has been placing little mottos and bits of poetry on the counters for the benefit of trade and employees—something new and worthwhile to think about each morning.

Garage a Light and Power Plant.

L. P. Juers, of Zumbro Falls, Minn., grew weary of poor lighting facilities and decided that the best way to obviate the difficulty was to buy an electric light and power plant of his own as do modern farmers.

After investigation, he purchased a farm



Light and Power Plant Which Paid Interest on Investment.

power and light plant, which he had installed in the salesroom of his garage. It furnishes not only lights but power for certain machinery used in his well-equipped machineshop, as well as lights and power for electrical conveniences for his home.

Current is generated by a $3\frac{1}{2}$ horsepower aircooled kerosene engine. This engine is made to do double duty by pumping air into the supply tank of the "Free Air" station maintained for the use of his patrons. There is, at all times, a 150-pound pressure without any additional expense.

In the accompanying illustration of the plant, the pressure pump, or compressor, shows plainly at the right; in the center are the engine and generating units, while at the left is the ample storage battery. The space required for its installation is negligible, and the convenience great.

As this engine has electric ignition, just a twist of the wrist starts it when there is need to generate more current—a second twist stops it.

Small motors and lights are run from the storage battery, but motors of one-half or one horsepower are run "off the dynamo."

Following is a table showing the amounts of fuel used and the time the plant was required to run to keep up with its load and keep the storage battery fully charged during one month.

July 13	.....1 gal.	$3\frac{1}{4}$ hrs.
July 15	.....2 gal.	3 hrs.
July 16	.....3 gal.	2 hrs.
July 22	.....4 gal.	$4\frac{1}{2}$ hrs.
July 27	.....$1\frac{1}{2}$ gal.	$1\frac{1}{2}$ hrs.
July 28	.....	$3\frac{1}{4}$ hrs.
July 31	.....3 gal.	$2\frac{1}{2}$ hrs.
Aug. 2	.....3 gal.	(over'ch) $6\frac{1}{2}$ hrs.
Aug. 9	.....2 gal.	4 hrs.

From this it can be seen that neither

the amount of fuel required nor the amount of time used in keeping the plant in working order is over large, even including the necessary monthly overcharge.

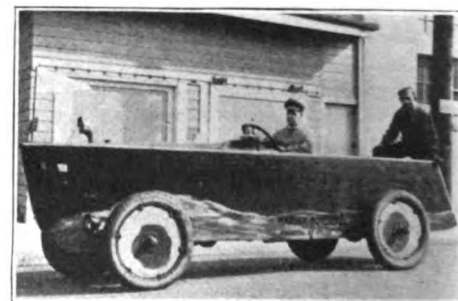
Some of this young man's neighbors, seeing his house and garage lighted and powered as conveniently as their city prototypes, were questioning, after the manner of small-town folk, as to the expense of such an outfit. The information was willingly given but the majority of them did not feel that they would be justified in such an outlay without business needs similar to Mr. Juers's.

After hearing their discussions, it occurred to this enterprising garage-man that here was an opportunity to please both his neighbors and himself. Therefore, he suggested to three of them, who lived conveniently near, that they have their houses wired for lights and other household needs and let him furnish them the electricity from his plant, as it would be amply able to generate sufficient current.

They jumped at the chance and at the time the writer visited the garage, the plant was carrying the load very satisfactorily.

Makes Impression of Speed.

The service car of the Warner Motors Co., Twelfth and Figueroa Streets, Los Angeles, is one that instantly catches the eyes



"Some Boat" Is This Efficient Service Wagon.

and leaves an impression as it passes along the street. At the same time it has the added advantage of making an impression of being very speedy.

This service "boat" is quite a bit of a boat. Built along the lines of a trim motor boat, it is stained and grained in imitation of highly-polished oak. At the prow and along the sides are painted realistic waves dashing up into spray.

At the rear is the low platform opening, and the driver sits much the same as if at the wheel of a motor launch.

Along each side is painted this sign:

"YOU ARE NEVER AT SEA WITH MITCHELL SERVICE."

It never fails to make people turn to look.

Practical Hints for Shop Mechanics

Easy Way to Remove Cuttings.

To remove cuttings from a cylinder-head bolt hole after the broken bolt has been drilled out, wrap several feet of insulated wire about a number of pieces of soft iron wire and insert them in the hole.

Attach each end of the insulated wire to a battery terminal and draw out the wires. To remove the cuttings from the wires, break the circuit.—A. C. O., Neb.

* * *

Wire Rings Save Valve Stem Wear.

Certain automobile engines give considerable valve trouble, and, unless they are ground about once for each two weeks of use, they begin to leak.

In one such case, a close examination showed that carbon was deposited on the valve stem and was wedging into the guide, thus causing the valve to stick. Wire rings were placed around the stems to keep the carbon deposits worn off and no further trouble was encountered.

After a year's use with the rings, the engine was taken down and the stems were bright and in a fine condition and not much worn.—S. E. G., Iowa.

* * *

Carbon-Burning Equipment.

The carbon-burning equipment shown in the illustration, renders valuable service around a garage, being mounted on rollers so that it can be easily and quickly moved from place to place.

It is provided with a metal base in the



Renders Valuable Service Around Garage.

form of a triangle. The base is provided with a flange, into which the bottom of the tank fits, holding the bottom squarely in place. Near the top of the tank, is a metal band that is clamped around the tank and

ONE DOLLAR EACH

Each shop hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

attached to three rods extending down to the base.

The carbon-burning device is attached to the ends of a five-foot hose.—C. W. G., Cal.

* * *

Prevents Losing Cotter Pin.

The Ford owner or repairer, when tightening up the fingers on the high-speed clutch on the Ford, or the fourth connecting rod, is always more or less afraid of dropping the cotter pin when inserting it into the transmission and it is just about like hunting for a needle in the haystack to recover it.

Often the cotter pin will drop out of your fingers when working, or from the jaws of the plier, and sometimes when it is partially inserted; you will tap it a little and not just hit right and pull it out when you pull the pliers back.

Play safe and take a soft piece of annealed wire or copper wire, or any wire or string will do. If string is used, tie a long loop in it through the ring of the cotter pin and when it has been inserted you can cut it. If wire is used, twist it about the pin once, and when the pin has been inserted, the wire may be untwisted and pulled out. Either way is all right.

If the cotter pin should be dropped, it can easily be recovered as the string will not go out of sight. It is always a tedious job to put the cotter pins in the fourth connecting-rod, and this will be overcome as you will feel safe.

If any metal object, such as a cotter pin should happen to drop into the Ford transmission, it must be removed before the car can run, for it may short the magneto and cause trouble. It may sometimes be recovered by taking a small horseshoe magnet and tying a string to it and dragging around

the transmission, thus attracting the object if it is anywhere near the magnet.

Often it can be recovered by taking off the transmission cover lid and pouring some oil through it, having the cap off of the bottom. This is repeated several times and tends to wash the object down to the hole. It can often be recovered then with your finger or it is sometimes washed out.—E. S., Iowa.

Leaks Around Worn Valve Stems.

Take a cupped washer that will fit on the inside of the valve spring with a hole to fit the valve stem. Then take a piece of heavy felt, punch a hole a little smaller than the valve stem, cut the felt washer to fit on the inside of the cupped washer.

Soak the felt with heavy oil, put the valve through the valve guide and put the felt washer on the stem. Put the cupped washer on next; take a small spring just strong enough to hold the felt washer against the valve guide; put on the valve spring, washer and pin. Turn over the camshaft to see if the extra spring will let the valve open without jamming the spring.—C. S., Ohio.

* * *

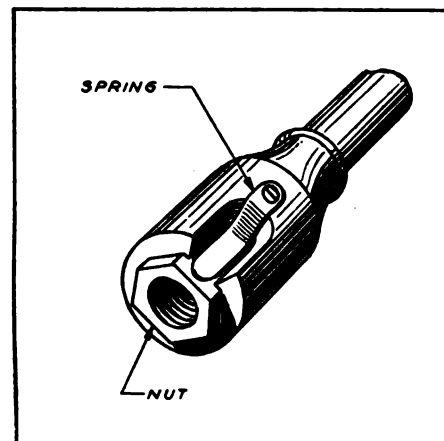
Better Than Shellac.

Keep a can of used differential grease in a handy place, with a paint brush in it. Apply this to hose and manifolds and all gaskets, in place of the shellac. It is more effective and easier to work with.—A. C. O., Neb.

* * *

Socket Wrench Kink.

Often it is desirable to hold the nut into a socket wrench when the stud is located just such a way that two hands can be used



Simple and Worth While.

to advantage. The simple kink of cutting a slot in the side of one of the flats of the wrench and attaching a stiff spring, as shown in the sketch, is worth while.—C. H. W., N. H.

Novel Grease Guns.

Grease guns, operated by compressed air, are very simple both in construction and operation. The one shown in the illustration consists of a pipe $2\frac{1}{2}$ inches in diameter with a cap screwed on at each end.



Grease Forced Out by Compressed Air.

One of the caps has a nozzle welded on, through which the grease is shot. An ordinary pneumatic tire-valve is welded onto the other cap. The grease is forced out through the nozzle by compressed air operating against a Bremmer ring.

This grease gun is operated by any ordinary tire-filling air hose by placing the end of the hose over the tire-valve and opening the cock at the end of the hose. It requires only two seconds to deliver the contents of these grease guns, which is about three pounds.

When all the grease has been shot from the gun, the Bremmer ring is placed back to the other end of the grease gun by removing the air hose from the tire-valve and pressing it against the nozzle at either end of the gun.

When the air is turned on, the Bremmer valve is shot back to the other end of the gun. The cap which carries the nozzle is then unscrewed and the gun is ready to be loaded.

In two other grease guns of similar design, the grease is forced out by the operator placing a finger over the small hole near the end of the pipe.

An air-hose is permanently attached to the end of the pipe near this hole, and when the operator desires to deliver grease, he opens the air-valve in the hose slightly, the air escaping through the hole in the pipe.

When the operator is ready, he delivers the grease in the gun. He places his finger over this hole, causing the air to accumulate within the gun and forcing the grease out through the nozzle.—C. W. G., Cal.

Save the Solder Scraps.

Keep a small box about the soldering bench to throw all scraps, odds and ends of solder into. It does not matter if there is dirt in it.

In spare time you can melt the solder in a ladle or a tin cup and mold in a floor board groove. With a little practice, it may also be made into wire solder by stringing it out on the floor through a nail hole in a pan or cup.

The dirt can be removed from hot solder with a spoon, a scrap of tin, or some such handy piece.—A. C. O., Neb.

* * *

Leaks in Carbureter Floats.

Leaks in metal carbureter floats are often small and very hard to find. By shaking the float, the splash of the gasoline can be heard and the next step is to locate the leak.

If a float is placed in very hot water, the gasoline will evaporate and set up a pressure in the float that will force out small bubbles and thus locate the leak.—S. E. G., Iowa.

* * *

Side Curtains Conveniently Stored.

A convenient way of putting away side curtains is to procure $1\frac{1}{2}$ yards of some strong cloth, preferably duck, and cut it into three strips each 16 inches wide and sew along the edges and one end. This will form two pockets about 16 inches wide and about 32 to 36 inches long.

Mark these pockets with an R for the right curtain, and an L for the left.

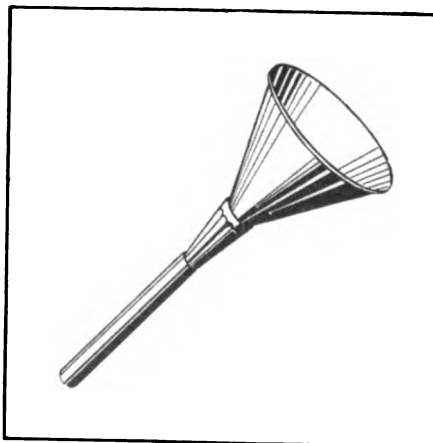
After folding the curtains neatly, with the rods or supports, they can be slipped into the pockets marked R and L respectively. When curtains are put away in this manner, it not only saves time in groping for the proper curtain but protects the curtains and sidelights as well.

The letters can be put on with paint and a small brush.—R. C. S., Tenn.

* * *

Useful in Priming Vacuum Tanks.

Lots of us have had trouble priming vacuum tanks and sight feed oilers on sta-



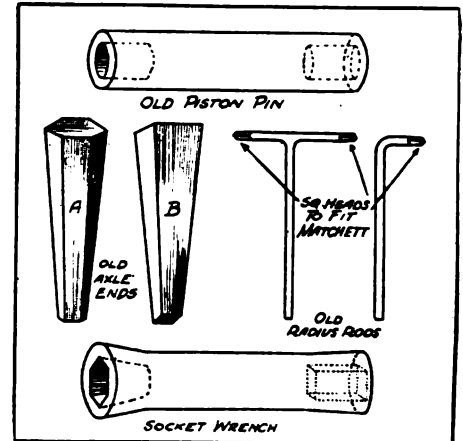
Saves Delay and Spilled Gasolene.

tionary engines. To remedy this, we procured the smallest funnel available and soldered a six-inch length of small copper tube in the end.

It will stand up of its own accord in a vacuum tank and saves lots of delay and spilled gasolene.—D. & F., Mo.

Good Home-Made Socket Wrench.

A very satisfactory socket wrench may be made of the worn piston pins from various-sized motors. Either hexagon or square sockets may be made by forming a mandrel from the point of an old axle and,



Made from Worn Piston Pins.

by tapering it, various sizes may be made, depending upon the depth of the mandrel being driven into the socket.

I also have a set of main-bearing wrenches, made from Ford radius rods, that I have used for more than a year.—O. P. F., Ark.

* * *

Substitute for Battery.

About a small garage, where there is not an extra battery and there is alternating current obtainable, the following substitute may be had. This is ideal for Fords or others cars without magnetos. It will not run the starter, but will produce current for almost any spark coil.

Take three 60-watt carbon globes, wire them in such a way as to reduce the voltage and yet have enough amperage to furnish spark, connecting one alternating current wire to the frame of the car and the other wire that takes current through the globes to the coils.

This may be used permanently on stationary gasolene engine ignition on either vibrating or make and break engines. A regular Ford unit is preferable when used on engines with spark-plugs. Coil should never be packed in anything inflammable.—P. B. D., Ill.

* * *

Leaky Spark-Plugs.

Very often, after the wiring has been renewed on a car, it will persist in misfiring. Frequently, the spark-plugs are worn and make a poor fit in the cylinder head.

This can be detected by squirting a little gasolene around the plug with the engine running. If bubbles rise, the plug is leaky. It should be removed and graphite applied in the threads, which will make its removal easy later on and at the same time will form a seal for the leak.—R. W. T., Mo.

Readers' Questions and Answers

Knock in Ford Transmission.

A Ford car which has been brought in for repairs has a very peculiar knock. It can be heard only when the clutch pedal is engaged (in low) and sounds as though it is in the transmission drums.

The knock can't be heard when running idle or in reverse or high. The drum is perfectly smooth and the bands are good. Can you tell me the cause of the knock and the remedy for it?—M. E. P., Wis.

Judging from your description of the knock in the transmission of the Ford car on low speed, it seems possible that the trouble is located in the low speed gearing. Perhaps something has passed between the teeth of the gears or it has been damaged otherwise.

It does not seem possible that the parts are worn as the knock would be noticeable at other speeds. Neither does it appear that a loose flywheel would cause this trouble as this knock would also be noticeable at other speeds.

We suggest that you make an inspection of the low speed gearing, and if it is not too badly damaged it may possibly be repaired. Otherwise, new gears should be used.

* * *

Scale in Water Jacket.

Please answer the following questions:

1. We have a Hupp in which the water jacket is full of scale or hard alkali. I wish you would give me your best advice as to how to remove it, or is it possible to get it out? This Hupp motor runs just fine for a light load, but when you want to drive 40 miles per hour, it will get so hot that it will miss badly and spit back through the carbureter. The spark-plugs get so hot that they fire the mixture before the spark jumps the gap. Do you think that airplane motor spark-plugs will cut out the spitting, for the other plugs will not stand the high heat of the motor?

2. How can a person successfully clean a radiator that is full of scale and grease?

3. How can a man stop all oil pumping off the Olds and Oakland car motors?

4. How should Hupp W. motor valves be set for correct timing?

5. Will a Bosch magneto D-V 4, at a speed of 4,000 r.p.m. give a good hot spark or not?

6. How much more power will you add to a Ford motor when you use a high tension magneto and take the other magneto clear out of the motor?

Wish you would answer these questions by return mail.—P. S., Kans.

1. The following solution may give you some relief from the scale which has formed in the water jacket of the car of which you speak: Make an acid solution consisting of four fluid ounces of sulphuric acid in ten gallons of water.

Drain the water from the system and fill again with a solution consisting of three ounces of caustic soda and three ounces of carbonate of soda into ten gallons of

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

water. Run the motor again slowly for 30 minutes, drain, and fill with pure water. Run 20 minutes more, drain, and fill with pure water and operate motor as usual.

You may possibly purchase a compound at your local dealer's especially formulated for the quality of water you are using in your locality, for removing such scale.

We do not believe your trouble can be eliminated by using airplane spark-plugs.

2. The solution mentioned, composed of caustic soda and bicarbonate of soda, should greatly assist you in removing scale and grease from the radiator. The system should be flushed with pure water after using this solution.

3. Oil pumping in any motor is usually a positive indication of poorly-fitted pistons and rings, or scored or improperly ground cylinders. However, in some cases we have known of the oil dips of the connecting-rods being shortened or the oil level being lowered. Extreme caution should be used in doing this or injury to the bearings is certain. We do not recommend this method of preventing excess oil.

We believe the proper method of preventing excess oil is by the proper fitting of pistons and the rings, regrinding the cylinders if necessary.

4. The valves of any four or six-cylinder motor may be set by the marking on the flywheel. Turn the motor over until the mark on the flywheel is 1 & 4 or 1 & 6, or the top center of No. 1 piston, as the case may be, appears directly on top. Continue to turn the motor over until the mark "In. O. No. 1" (meaning inlet opens) appears directly on top.

The camshaft should be installed with

the crankshaft, so that the inlet valve will just touch in starting to open in this position. The rest of the valves must follow in rotation, as they are controlled by the design of the camshaft in all L-head motors. In the T-head motors with two camshafts, the same method is followed by checking with the marks on the flywheel.

About 0.004 inch is usually allowed between the push rod and valve stem on the intake valve, and 0.006 inch on the exhaust valve between the push rod and the valve stem, for setting clearance.

5. A Bosch magneto should give proper spark at the speed mentioned.

6. We do not believe the power of a Ford motor could be increased by installing a high tension magneto, as the only advantage would be the simplification of the ignition system and accessibility.

* * *

Removing Old Paint.

Please let me know, through your next number of the AMERICAN GARAGE & AUTO DEALER, the best way to remove old paint from a car before repainting.—A. L. S., Iowa.

There are several methods of removing old paint, prior to putting on the new coat.

There are certain liquids which may be purchased at almost any painters' supply store that will soften the old paint almost instantly, after which it may be removed very quickly with an ordinary wide putty knife or scraper. Directions will be found on the container of the liquid.

The old paint may also be sanded off with sandpaper, but this is a very long, tedious job.

The flame of a blowtorch may help greatly on some parts of the car.

Caution should be used in bringing the flame near gasoline connections or where gasoline would be possible to ignite.

* * *

Starting Trouble.

I have a Nash Six motor that is giving considerable trouble about starting. That is, the motor refuses to start when you use the starter on it but when the crank is used, it starts off without any trouble. The starter is in good working condition and turns the motor all right.

I have installed new valves, new piston rings, gone over the entire ignition system and examined the intake manifold for leaks. The motor runs well after it is once started and will crank with the starter for a few minutes after it is stopped.

I believe the trouble lies in the carbureter, but the party to whom the car belongs says that he has taken it to several other garages and they say the carbureter is not the trouble.

Please give me an answer by return mail.—B. M., Fla.

Judging from your description of the trouble with the Nash motor, we suggest that possibly the compression is very low,

which is usually the case where new rings are installed in a worn cylinder.

You do not say that you have lapped the new rings in, and we assume that you have not. Also, if the rings are fitted quite tightly and the motor turns over very hard, excessive current might be drawn by the starter. This gives you a weak spark for ignition, provided the motor is equipped with battery ignition.

We would also suggest that you examine the valves to make sure that all have the proper clearances between the push rod and the valve stem. We do not believe your carbureter is at fault.

* * *

Alcohol as Fuel.

What are the prospects for the use of alcohol as a motor fuel?

The hazards involved in the storage and handling of alcohol are less than in the case of gasoline and it is also a cleaner fuel. Burning alcohol is extinguishable by water.

It would, therefore, seem that there are existing possibilities in the use of alcohol as a fuel.—A. V. M., Utah.

Some authorities have expressed the belief that alcohol will become one of the principal sources of supply of motor fuel in the future.

The outstanding and fundamental attraction of alcohol in substitution for fuel obtained from coal or oil deposits resides in the fact that alcohol is derived from the vegetable kingdom, from supplies of raw material which are being continuously renewed and are susceptible of increase.

It is unlikely that the food products, such

as potatoes, corn, etc., can be used much longer for the manufacture of alcohol, owing to food demands, but there are, of course, almost unlimited sources from which raw materials in the form of by-products, etc., may be obtained.

The main difficulty is that those raw materials which may be used for the production of alcohol are to be found only in sections so distant from each other as to make any appreciable supply unavailable.

* * *

When Installing Bearings.

Can you describe for me the best method of putting ball bearings into place? I have had considerable difficulty in doing this work, and shall appreciate any assistance you can give me through your magazine.—E. V. C., Okla.

When driving ball bearings into place, some form of soft metal yoke or tubular section should be used. In this way, the hammer blows are distributed evenly, and the bearing is driven home without injury.

In using a double yoke member, one prong can be placed against the inner race while the other rests on the outer race. In removing a bearing or part, the pressure should be applied where the part is a tight fit on the shaft or in the housing.

As a general thing, the inner race is a tight fit on the shaft, while the outer race is a push fit in the housing. When it is necessary to use blows in removing a bearing, a brass or babbit metal bar or a block of hard wood should be interposed between the hammer and the part.

Also the blows of the hammer should not all be directed at one point, but scattered around, giving blows in succession at points directly opposite. A series of blows at one point on the bearing tends to cramp it.

* * *

Adjusting Valve Tappets.

What can be done to eliminate tapping of valve tappets? Except for this difficulty, the motor of a car we have runs as smoothly as we could wish.—R. L. O., Ky.

There occasionally develops in an engine normally quiet in operation a tapping of one or two of the valve tappets. For quiet operation of the tappets there must not be severe impact between tappet and valve stem.

If the tappet is moving fast before it commences to lift the valve, the impact will be severe and there will be noise. The tappet should be adjusted so as very nearly to touch the valve stem.

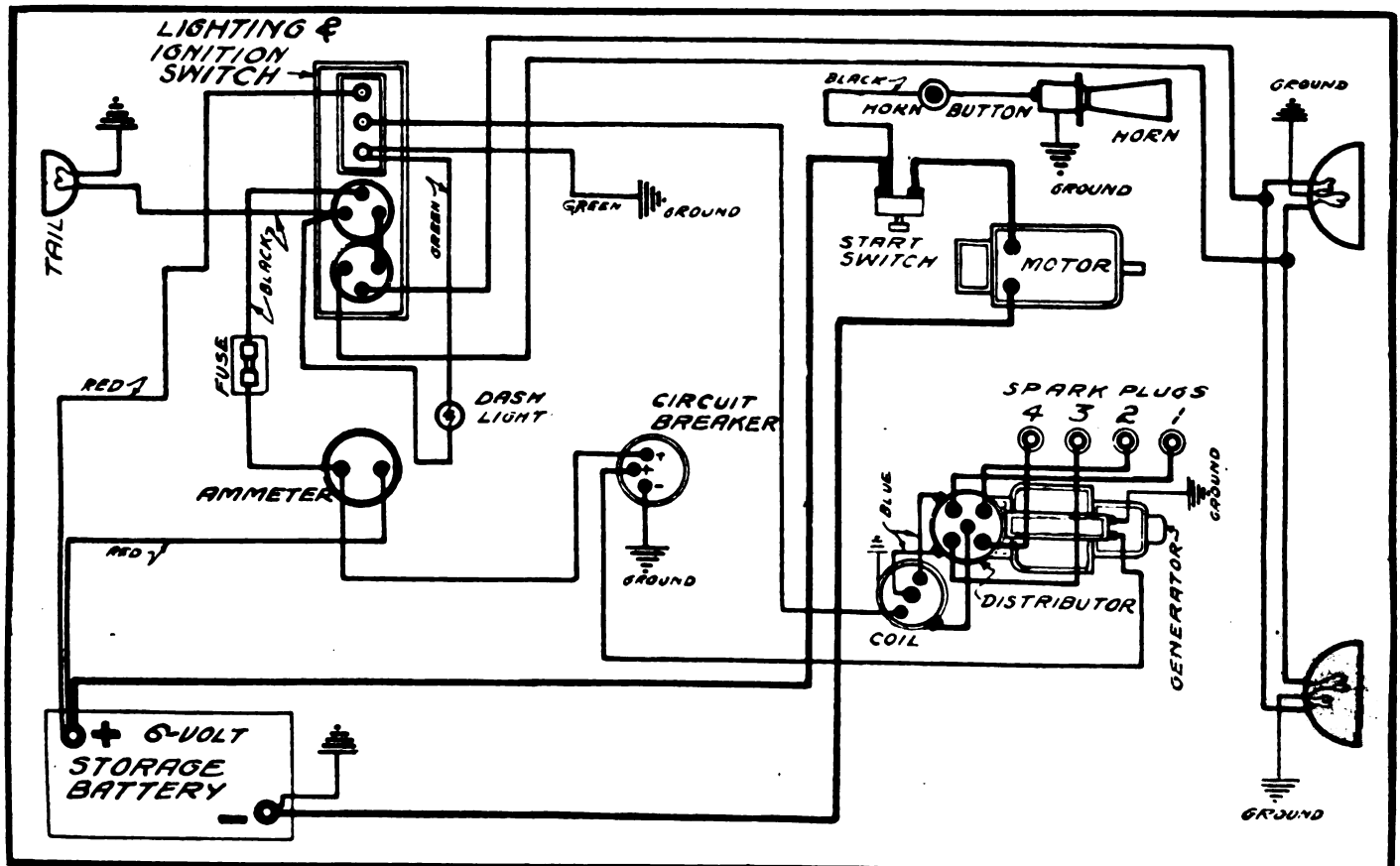
When the engine is hot at the end of a run (the proper time to make adjustments) the tappet should be adjusted so that it just touches the valve stem. The valve, being hot, will not expand any more, and when the tappet is adjusted in this way very good results will be obtained.

* * *

Wiring Diagram for Chevrolet.

Will you please publish a diagram for the model 1915-16 Chevrolet in your magazine soon?—A. G. R., Ark.

We are giving the diagram for the Chevrolet 1915-16, H-2½, H-3 and H-4, below.



Wiring Diagram for Model 1915-16 Chevrolet.

Find "Golden Rule" Service Profitable

Some Folks Have Believed the "Golden Rule" Could Not Be Applied in Business Practice—This Man Declares His Success Is Directly Due to His Belief in and Practice of This Principle in Dealing with Others

"'Service by the Golden Rule,' is a policy that should spell success for any business, and particularly for the service station devoted to the maintenance, repair, and distribution of parts for magnetos, generators and starters. I adopted such a policy for that reason, and also because it has been practically an unknown quantity in this field, and I expect to build a wonderful business by living up to it."

The speaker was Peter Sampson, founder of the Sampson Electric Co., with one of the largest service stations in the world, specializing on automotive electrical equipment. They are located at 2334-36 South Wabash Ave., Chicago.

"The biggest stumbling block in this business is the fact that it is so technical that it is a mystery to 99 per cent of the car-owning public. This has made them easy prey in the hands of unscrupulous service station operators, and is altogether responsible for the suspicious attitude of the average car-owner toward the electrical service station.

"To overcome this resistance necessitated a great deal of preparation. My first step was to surround myself with an organization that was familiar with servicing troubles, and one that was imbued with the spirit of fair play and the Golden Rule. This was difficult, but the results are more than worth it. I pride myself on having the most efficient organization of its kind in the country. When it receives a magneto, generator, or starter, it knows what to do with it.

"The secret of success is not so much in carrying a vast amount of detail information, as in knowing where to get it when you need it. Our men are hand-picked, well trained, and they know that the only

kind of results that count are those that please the man who foots the bills, and they get those results. When a magneto, generator or starter comes into our station, it does not mean simply a job to us. It



Proprietor of the "Golden Rule" Service Station.

means an opportunity to sell that particular customer some faith in human nature, and we do it by first selling him confidence in our ability to take care of him, and topping it off by means of a well executed piece of work.

"We give him a concrete example of one service station that plays the game strictly on the square—one that he couldn't, by the wildest stretch of his imagination, call a robber or a thief. And the number of car-

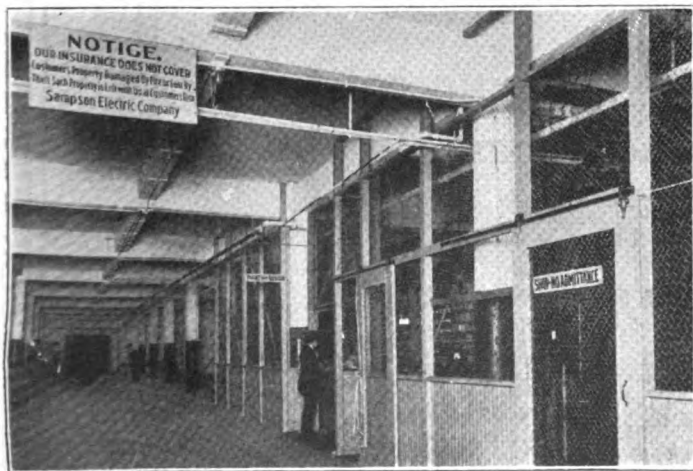
owners and repairmen who do not so designate electrical service stations are few. Every time we sell a job, we sell satisfaction with it.

"You might think that our method of doing business is charitable. It isn't. It's good business and our policy is demonstrating itself every day through the priceless 'by word of mouth' advertising of a host of customers to whom we have sold confidence in our ability and willingness to deliver a square deal.

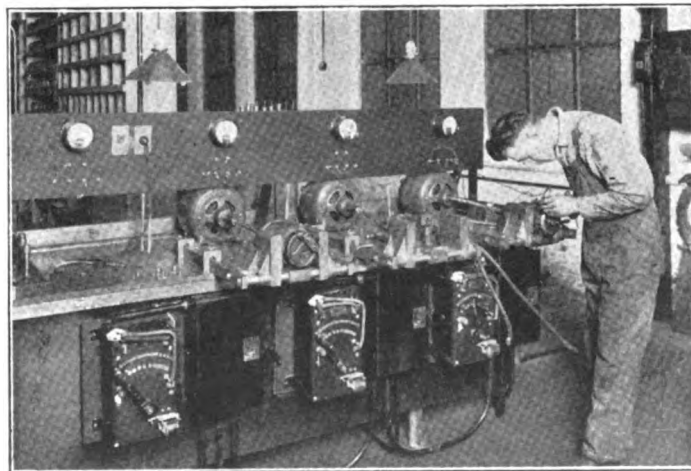
"Ours is a blind game—that's why it has so many birds of prey ready to take advantage of the helpless. We remove as much of the mystery from it as is humanly possible. We have no objection to telling and showing any man just what is wrong with the electrical equipment he brings us for attention—what is necessary to put it in first-class operating condition, how much it will cost and what to do to avoid a repetition of the same trouble. That costs him nothing, and he is at liberty to have the work performed or take it elsewhere.

"It has been our experience that the average owner or repairman is willing to pay for what he gets, and we make it a point on every job to make it plain that that is all we expect—payment for what we give him—and we go a step farther and show him that when he deals with us he also gets what he pays for.

"It is common knowledge that in many a blind game the purchaser does not always pay for only what he gets nor get all that he pays for. We consider that the customer's confidence and good will is the strongest asset we can develop, and we try hard to gain it. Once we get his good will, we would consider it a sacrilege to do anything to jeopardize it.



Service Floor of Sampson Electric Co.



Special Test Equipment—Each Unit Driven by Separate Motor.





When Springs Break,

put on **VULCAN**
The Replacement Spring.

This name plate marks our honest determination to produce the best spring. It is for your guidance.

Order VULCANS from your jobber, and insist on the name plate.

JENKINS VULCAN SPRING COMPANY

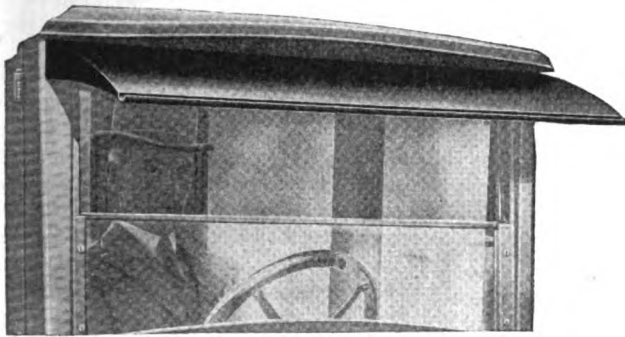
RICHMOND, INDIANA

<i>Boston, Mass.</i> 819 Boylston St.	<i>St. Louis, Mo.</i> Main and Cedar Sts.
<i>Dallas, Tex.</i> 2216-18 Commerce St.	<i>San Francisco, Cal.</i> 1035 Polk St.

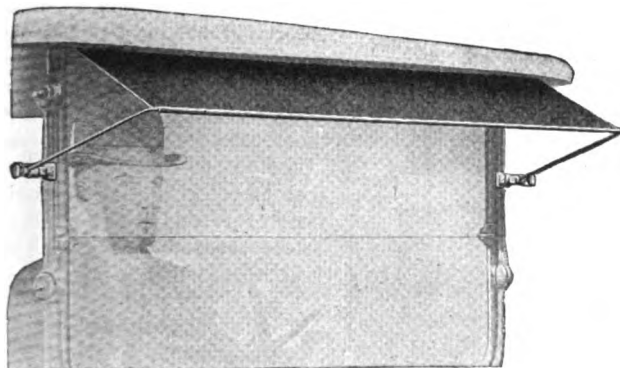




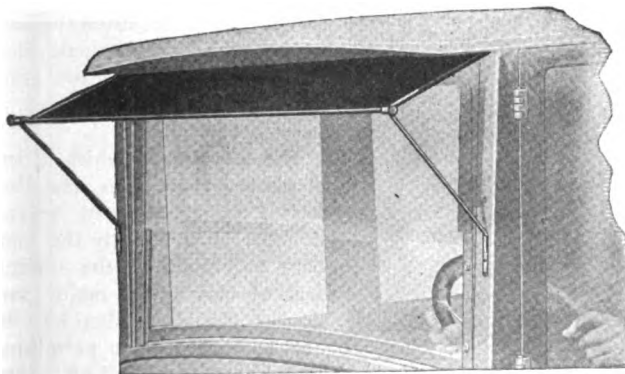
(by the makers of
VULCAN Springs)



Type A, universal, fixed type for all closed cars with straight fronts.



Type B, universal, adjustable type for all open cars.



Type C, universal, adjustable type for all closed cars.

Quantity production and distribution enables us to offer all car owners of America a very high grade vizor at moderate cost.

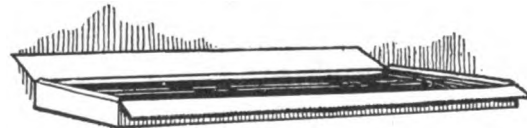
Type A is artistically designed to merge harmoniously into the lines of the closed car, and when applied is in effect a part of the car itself. The application can be made in about five minutes with screws and full instructions that are included.

Type B is a universal, adjustable type for all open cars, and is easily applied on any open car. The windshield braces are our own patented and quickly adjusted universal type for all shields, and angle of vision is instantly changed with two small thumb nuts. Folds neatly into top when top is lowered.

Type C is same as type B except applicable only to closed car jobs.

VULCAN VIZORS are made of the very highest grade Armco rustless, cold rolled, 20 gauge sheet steel, and are handsomely finished in baked black enamel of a special dull satin effect. We are marketing these vizors on a strict policy of satisfaction or no sale. There is a liberal discount to the dealer.

If your jobber cannot supply you with genuine VULCAN VIZORS, our name on everyone, write us—today.



Packed in individual corrugated fibre carton, with necessary screws and simple instructions.

JENKINS VULCAN SPRING CO.

Richmond, Ind.

Branches:—Boston, Mass., 819 Boylston St.; Dallas, Tex., 2216-18 Commerce St.; St. Louis, Mo., Main & Cedar Sts.; San Francisco, Cal., 1035 Polk St.

V 2

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

"When we have considered that angle of the business, there is still another one. That is the technical, or shop end, embracing special testing equipment, scientific data, etc., all of which are necessary in handling magnetos, starters, and generators. Unless it is possible to develop a large volume of this business, it is, of course, folly to invest in such equipment.

"The small-town garage, repairshop, or dealer, does not have enough of this business to warrant such an investment, and for that reason, he sends this work where he believes he can get prompt service at a reasonable price. If he doesn't get it on the first job, he sends the next one to someone else, and he keeps on trying until he can locate a place where the kind of service he wants can be obtained. It is interesting to note, in this connection, that there is no other business where the consumer is more ready to try somebody else, than in this one.

"The testing equipment used by the Sampson Electric Co. was built by our superintendent, R. E. Van Sickle, who from 15 years' experience in this business has developed an equipment embodying a number of efficiency and time-saving features. Each job on test is driven by an individual motor through a flexible shaft and chuck combination that enables the man in charge of tests to set his machines up in less than a minute.

"This eliminated the use of sprockets and chain, belts and pulleys, and the other attachments most commonly used, with their resultant noise and confusion, to say nothing about the time wasted in lining up a job before starting it on its test run. Each job on test is checked against factory specifications and its performance must be absolutely right before it is passed as 'O. K.'

"We carry a stock of parts for all makes and types of magnetos, generators, and starters, and are in position to supply them to anyone in need, without delay. Our purchasing department is in constant touch with manufacturer, surplus stock dealer, etc., and in a great many cases where it is necessary to provide parts for obsolete equipment to our trade, we can get them in shipment with no more delay than would be occasioned in the handling of an order for a part of standard manufacture.

"Our service is the means whereby we create a satisfied clientele, and any garage, repairman, or car dealer can make our institution the electrical branch of his business, with the assurance that anything he sends us will be handled as he wants it handled—in strict accordance with the Golden Rule. He'll get the kind of treatment from us that we would like to get if our positions were reversed.

"We stand right behind anything we do, and any time we turn a job out for anybody, we guarantee that satisfaction will go right with it. Efficient organization and

The Good Old Golden Rule Still Lives.

"'Service by the Golden Rule' is a policy that should spell success for any business," says Peter Sampson, and the splendidly equipped and prosperous service station of which he is the proprietor proves the truth of his statement.

"My first step," continues Mr. Sampson, "was to surround myself with an organization that was familiar with servicing troubles and one that was imbued with the spirit of fair play."

"Once a man passes muster with us and we put him to work, we make it a point to see that anything that will encourage him and add to his contentment is done."

"We have a high-grade shop organization that balances in every respect with our service department and gives the co-operation so essential in building up a real business."

Mr. Sampson's story of the success of his methods is inspiring and adds one more to the daily increasing proofs that real and constructive service forms the only durable cornerstone upon which to build success.

a big volume of business has reduced our overhead expense to a minimum.

"We have no high priced 'deadheads' on our payroll, and every penny spent with us brings back a penny's worth of honest-to-goodness 20th century value. If we do any experimenting—and sometimes it is absolutely necessary—we do it on our own

time, and the loss is charged to our research department, not to our customer.

"We do not operate a school for electrical mechanics, as do some service stations, nor do we employ freshly graduated students of electrical schools, to gain their practical experience at our customers' expense.

"Every man in our shop has had years of experience, and is an expert in his particular field. Just as we specialize on any make or type of magneto, generator or starter, so we expect our repairmen to each specialize on individual makes and types of systems.

"We have capacity for 50 cars in our garage, and have arranged our stockroom and shop to give maximum results with a minimum expenditure of effort. We realize that good work can not be expected from a dissatisfied workman, and there is no part of our entire business which receives more care than the handling and choosing our shop help.

"Once a man passes muster with us and we put him to work, we make it a point to see that anything that will encourage him and add to his contentment is done. I wouldn't care to have a mechanic working in my shop whom my wife wouldn't welcome in our home, and the result is that we have a high-grade shop organization that balances in every respect with our service department, and gives the co-operation so essential in building up a real business, and one that any man might well be proud of.

"We extend a cordial invitation to anyone who is interested to visit our plant, and make an inspection of the facilities we have for rendering service on magnetos, generators, and starters. If there are any of your readers who are dissatisfied with the connections they now have for handling this class of work—and we know their numbers are legion—invite them to try us and see for themselves what real service is. We specialize in that."

De Luxe Piston Ring Manufacturers in New Building.

The Clark-Turner Piston Co., Los Angeles, Cal., which manufactures the De Luxe light weight gray iron piston, because of its remarkable growth since its formation less than two years ago, has found it necessary to build a new plant.

The foundry, in which a new electric furnace was installed, has been completed several months. Just recently the company accomplished the difficult feat of moving the major portion of its machine shop into the new building without permitting the production to fall off at any time.



Sign Carries the Message of "Service by the Golden Rule" to Passersby.



Established 1854

Refuting -- Misleading Claims

Exclusive Features of Curtis Two-Stage Air Compressors

Curtis Intercoolers are made of COPPER tubing with thin COPPER radiating fins rigidly tinned to the copper tube. Copper throws off heat quicker than any other metal.

Have control splash oiling system—requiring 1/10 to 1/15 amount of oil and attention.

Breather valve is so constructed that a partial vacuum is created in the crank-case, preventing any leakage or waste of oil. The compressors are at all times bone dry on the external surface.

Hand unloader which permit compressors to be started against full tank pressure, preventing burning out of motor, blowing fuses, burning or jumping of belt.

Valves are of light weight, large area, and can be inspected without removing head or loosening a pipe connection or fitting.

Have all the good features of Curtis single-stage compressors *plus* two-stage efficiency.

During our sixty-seven years of business existence, we have never sold our product by misleading statements or unsupported claims.

as to Horse-Power and Capacity Ratings of Two-Stage Air Compressors

As manufacturers of BOTH Single-Stage and TWO-STAGE Air Compressors (therefore, unbiased), we desire to go on record to the effect that—

1—Claims to the effect that a Two-Stage Compressor will compress anywhere from 15% to 50% more air with the same horse-power;

or

2—That Two-Stage Compressors will compress the same volume of air with 15% to 50% less horse-power—

are absolutely misleading statements, not supported by facts.

Curtis Pneumatic Machinery Co.

1515 Kienlen Avenue

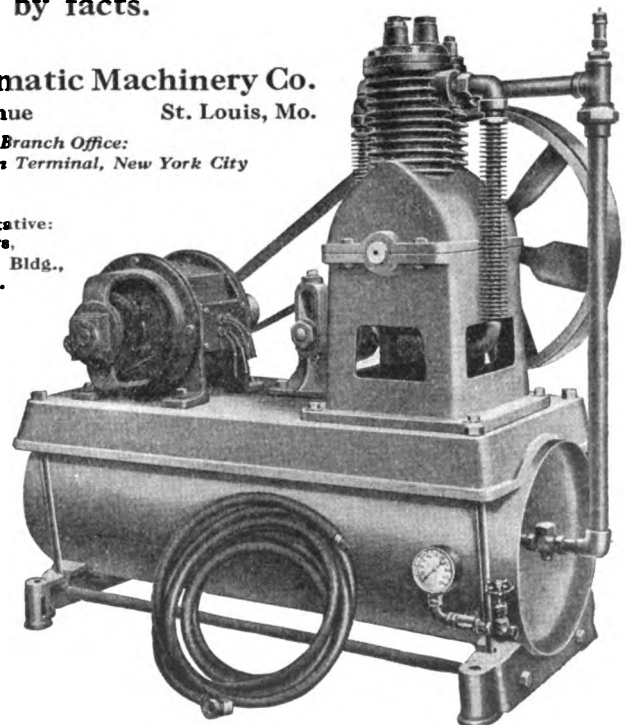
St. Louis, Mo.

Branch Office:

590-U Hudson Terminal, New York City

Canadian Representative:

Joseph St. Mars,

706-B Sterling Bank Bldg.,
Winnipeg, Can.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 24.)

a light tap of a hammer after turning it over to make the second weld.

The flame was lighted and adjusted to the strictly neutral position. The point of it was played back and forth along the upper groove until the steel reached a bright red stage. Then the flame was concentrated in a small area at one end of the groove. Here it was kept in gentle motion until this portion of the groove bottom melted and flowed together.

Meanwhile, the mild steel filler rod was held close enough to the flame that it became red-hot. As soon as the groove bottom melted together, the filler rod was placed in contact. Then the flame was played over both the groove and the end of the filler. A quantity of the rod was melted and settled into the groove metal, filling about half the groove depth.

As this was done, the flame and filler were advanced along the groove bottom to melt and fill another portion of it. Again advancing the fill, still another portion in the same way. Thus, about half the depth of the groove was filled from end to end.

Then the process was doubled back along the weld to deposit a series of connecting pools of metal in a second layer on top of the first layer. Great care was employed to see that the first layer metal, as well as the sloping walls of the V-groove, were molten before adding more filler metal. The flame was never allowed to rest long in one spot but was continually swinging or revolving, melting little pools, filling them and joining them to other pools. The entire groove was filled and a surplus piled along the top for strengthening purposes.

This surplus was made rounded and smooth by employing the flame pressure to sweep the fluid metal. The filler rod was also used to give a pleasing appearance to the surplus metal. Bits of slag were flirled aside with it, and rough spots were puddled down. In fact, the filler rod was scarcely ever motionless, but was continually twisted and puddled in the weld. At no time was it permitted to drip into the weld, but was always fed in while in contact.

As soon as this groove was finished, the weld was allowed to cool slightly—not enough for the pull of contraction to make the connecting-rod crooked, but sufficiently to prevent the center from sagging when the rod was turned over to make the other weld.

When the first weld was set, the connecting-rod was inverted and the flame immediately applied to the second groove. This groove was treated almost exactly like the first one. The bottom of it was carefully fused and flowed together before adding the filler metal, care being taken to see that the bottom of the first weld was re-melted and puddled clean. Two layers were made in continuous pools

along the second groove, a well-rounded surplus being added to the last layer. This surplus reinforced the weld, both in actual strength and in appearance.

When the last groove-filling was complete, the connecting-rod was placed on edge while the operator re-melted the ends of the weld to be sure they were properly fused together. The spot-weld on each edge of the rod was melted out and the flame heat allowed to soak deep, in order to insure against poorly connected portions in the original weld. These re-melted portions were filled with new metal after the manner employed in the groove-welding.

This connecting-rod was ready for service as soon as cold enough to handle. No attempt was made to slow-cool it, or to anneal the weld. In ordinary shop practice it seems to do little good to anneal or force slow-cooling of connecting-rod welds, although some welders claim the contrary.

BOOK REVIEWS.

GASOLINE AUTOMOBILES, by James A. Moyer. Published by McGraw-Hill Book Co., Inc., New York. 261 pages, 5½ ins. by 8 ins., 212 illustrations. Price \$2.

This is one of the most interesting of the new automotive books now being offered, particularly to car-drivers.

In it is given a clear and interesting presentation of the essential principles of automobile construction and operation, making it a very practical reference book for those whose training has not been such as to familiarize them with automobile construction.

The book furnishes practical help to drivers who, when faced by ordinary operating troubles, want to know how to locate the cause and apply the remedy.

The ten chapters cover automobile types, parts and engines; gasoline and substitutes; gasoline carburetors; ignition; magnetos; ignition testing; electric starters; clutches, transmissions and differentials; lubrication and cooling systems; and automobile troubles and noises.

The illustrations are simply and clearly drawn, and each detail distinctly shown. A number of wiring diagrams are given, as well as types of engines.

It is a book which undoubtedly will prove to be very helpful to anyone who drives a car, as well as to those who repair them.

DYKE'S AUTOMOBILE & GASOLINE ENGINE ENCYCLOPEDIA, 12th edition, second run, by A. L. Dyke. Published by A. L. Dyke, St. Louis, Mo. 960 pages, 3,362 illustrations, 6,700 lines of index, large size 6 ins. by 9 ins. Price \$6.

Do you know how to construct an electric testing outfit for starters, generators, magnetos, etc? Do you know how to make "cadmium tests" for storage batteries and how to disassemble and repair batteries? How to measure clearance of pistons, rings,

etc.? Do you know the specifications of 1920 cars?

No, this isn't an "Edison test." It is just an inkling of the information that you will find in the new edition of Dyke's Encyclopedia. It is practical, complete and very thorough and the subjects are dealt with in so simplified a manner that even the inexperienced automobilist can readily understand.

Dyke's will teach you how to become an automobile repairman; an engine expert; the details of testing and overhauling; electric starter, generator and electric wiring; ignition; tire repair; storage batteries; carburetors; tractors; trucks; the operation of automobiles, tractors and trucks, and radiator repair.

Some of the new subjects added to the 12th edition are: Voltmeter and ammeter tests—how to make all electric tests, and how the meters are constructed and used, including Ford tests; how to test magnetos and repair them, assembly and disassembly; how to repair tires, how to vulcanize, and the proper equipment for starting into the tire repair business; Ford electric starting, generating and lighting systems.

The tire subject, for instance, is very interesting. One learns the difference between the "molded" tire and "wrapped tread" tire; the difference between the "fabric" tire and the "cord" tire and the advantage and disadvantage of each. Such subjects as blowouts, stone bruises, loose treads, etc., are thoroughly treated with an explanation of the cause and how to make the repair.

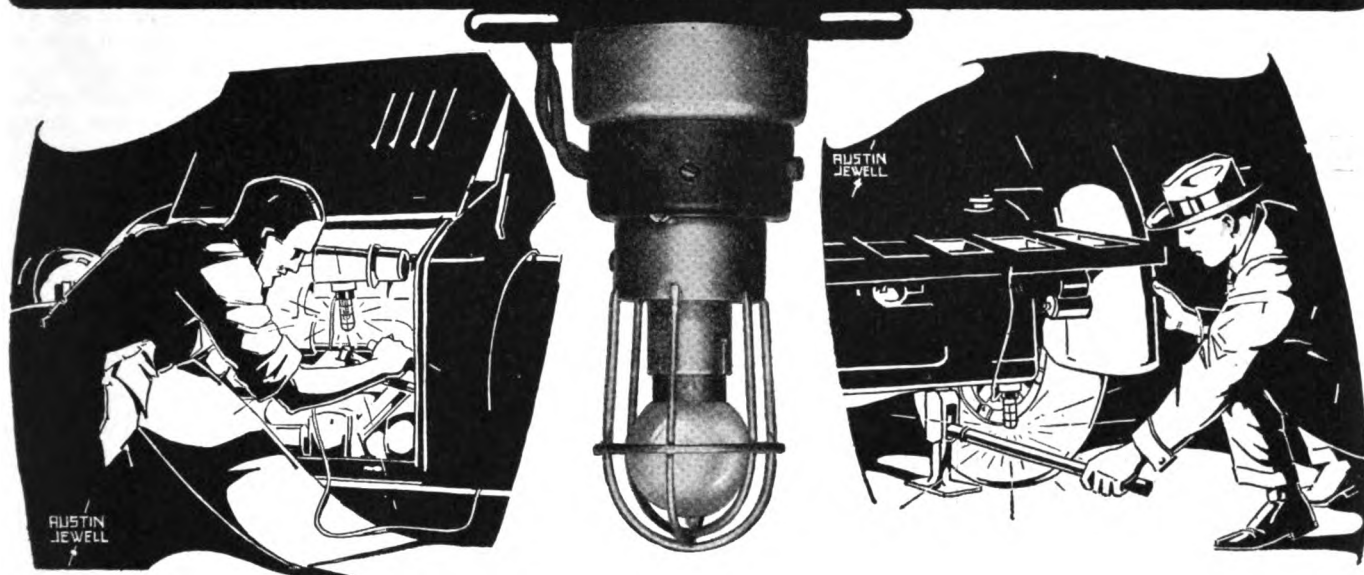
The subject of vulcanizing not only deals with the "sectional" method, but with the "wrapped tread" method, as well. The equipment necessary to start into the tire business is also dealt with. In fact, many pages are devoted to the subject of "how to start into the different branches of the automobile business," from building and equipping a home garage to that of one for business.

The book covers practically every phase of the automotive industry, and deals with automobiles, trucks, tractors, motorcycles, airplanes and airplane engines, including the Liberty engine, all of which are fully illustrated.

There are supplements with 332 illustrations on the Ford and Packard car, part of which are printed in colors. Every detail of the Ford is explained. For instance, how to rebuild a Ford and how to make every known repair from the axle to the engine. The new Ford electric system is fully illustrated; in fact, the illustrations go so far as to show the internal wiring of the "cut-out" and its principle of operation. There are also five colored inserts, a dictionary of motor-ing terms, and a great deal more of valuable and interesting information.

All in all, it is a book which every garageman, repairman and automobilist will find a very useful addition to his shelf of reference books.

THE MAGNET-LITE



"The Light with the Magnet Grip"

Sticks and stays wherever you put it

The Magnet-Lite is a trouble light that grips through an electro magnet on any metal part of the car.

The Magnet-Lite is equipped with a twelve foot cord, making it possible to carry the light around to the rear of the car, attach to the under side of the axle, springs or brake band drum.

The Magnet-Lite carries a six candle power bulb protected by electric welded nickle guard.

The Magnet-Lite is packed in a neat, oblong, black Japanned metal box—slips into the pocket or tool carrier of your car.

The Magnet-Lite is an accessory rapidly becoming as essential as any of the several devices once called accessories but that are now part of standard equipment.

The Magnet-Lite has as many uses around a car as there are things that can happen to it. An indispensable convenience at night when changing a tire, hunting trouble under the hood, and in a hundred other places every motorist knows.

THE MAGNET LIGHT COMPANY
1509 South Michigan Avenue
Chicago, Illinois

Make money selling the Magnet-Lite

Every car owner in your vicinity is an interested prospect for at least one Magnet-Lite. It sells for \$5.00 and leaves you a nice margin of profit.

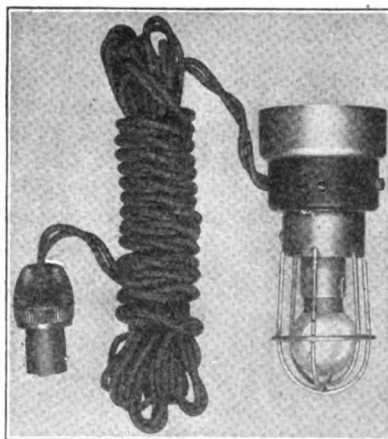
The Magnet-Lite is being advertised to your customers beginning with the July issue of such publications as Motor, Motor Life, etc.

"Silent Salesman" counterstand helps you sell Magnet-Lite.

Ask for full particulars about discounts, territory, selling helps, etc.

Distributors—Dealers

Some choice distributor territory is open to "Live-wires." Dealers, don't overlook this great money-making accessory.



Use This Coupon for Sample Magnet-Lite

The Magnet Light Company,
1509 So. Michigan Ave., Chicago, Ill.

Enclosed please find \$5.00 in check ☐ Postal Money Order ☐
Express Money Order ☐ Currency ☐ For which please
send me One Magnet-Lite complete for 6-8 Volt ☐ Single
Contact ☐ 12-16 Volt ☐ Double Contact ☐

Name

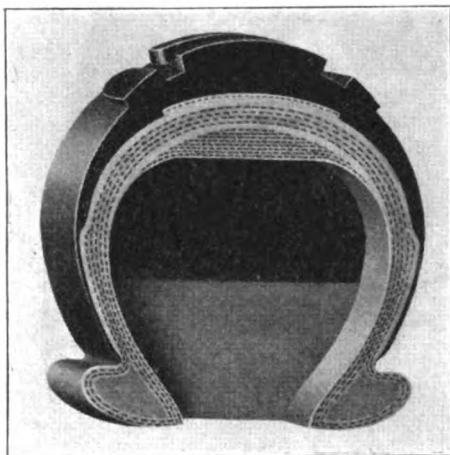
Address

Accessories—Dealers' Key to Profits

Dayton Airless Announces New Tire Construction.

Many important changes have recently been adopted in the new construction of Dayton airless tires which its manufacturer says have added greatly to its wearing qualities.

The tire is built with piers of rubber, set about an inch apart and vulcanized as parts



Construction Gives Strength and Flexibility.

of the tire itself. These piers take the place of an inner tube. They were formerly made of one kind of stock, but now they are made of what is known as two-stock compound.

The lower half, or base of the pier, is made of a compound that adds strength and endurance to the side walls and is of sufficient density to prevent rim cutting. The upper, or outside half of the pier is made of much more resilient, springy, shock-absorbing rubber, adding greatly to the easy-riding qualities of the tire and insuring flexibility.

As a result of this new construction, the new Dayton airless tire on a Ford car without load indicates a depression of approximately 14 per cent, whereas with the old construction the deflection was approximately 6 per cent.

Another important change which was made several months ago, in the construction of the Dayton airless tires, is the breaker strip. The new breaker strip is of very much heavier material, and it is stated that tests which extend over a period of more than a year indicate that the change in this feature has entirely eliminated tread separation.

An interesting item in connection with this is an offer by the company's chief engineer of a reward of \$1 for any case of tread separation that may develop.

A third important change in the new Dayton airless tires is in the tread. In addition to adding a broader face through an

extra non-skid feature, the entire tread of the tire has been increased 1/16th of an inch.

The value of this change in the tread construction is that it gives a wider bearing surface on the road, which affords a greater tractive strength and this, together with the added resiliency of the piers, has overcome any tendency of the tires to skid.

Formerly the tread of Dayton airless tires was built by laying strips of rubber, one on top of another, until the desired thickness was obtained. The result of this construction was what is known as a straight-grain tread.

In other words, the grain ran end to end of all strips used and when a break of any kind occurred in the rubber, there was a tendency on the part of the tread to split lengthwise of the tire.

A new machine has recently been put into operation in the making of the tread. This machine operates under heat and embodies knives or blades which chop the rubber into small particles and, by pounding and rubbing under high temperatures, the rubber becomes sufficiently pliable to form the tread at one operation. This method of construction destroys the grain of the rubber and eliminates all possibility of splitting of the tread.

Another important change in the construction of these tires is a greatly increased thickness of the gum strip which is placed between the annular rib and the carcass of the tire. The gum strip between the tread and the carcass has also been changed so that it covers the entire body of the tire, and results in a closer adhesion and added strength to the whole construction.

It is an interesting fact that in a Dayton airless there are three times the fabric and more than four times the rubber used

change in prices. All the changes that have been made have been proven by months of tests under all kinds of road and weather conditions.

The new Dayton airless tire is not only more resilient, not only does it hold the road better than the old construction, not only does it have all of the advantages of puncture-proof, blow-out-proof, trouble-proof service, but with the new improvements it also insures to the user a greatly increased mileage.

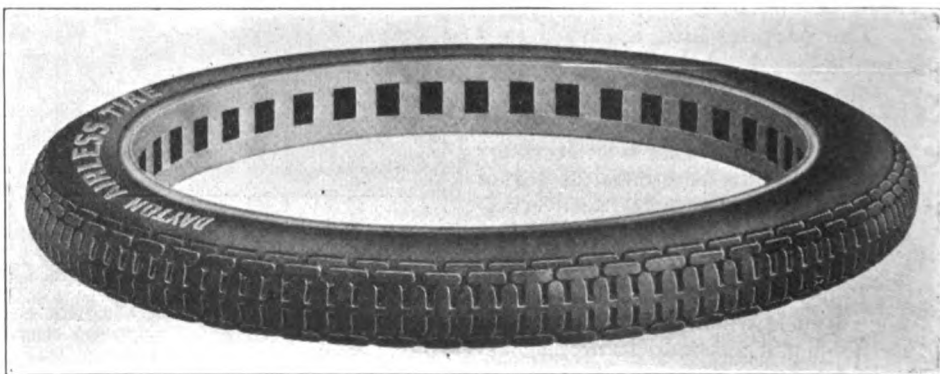
Further information regarding these tires may be obtained from the manufacturer, the Dayton Airless Tire Co., 102 E. Third St., Dayton, Ohio. Mention the American Garage & Auto Dealer when writing.

A Necessity in Rain or Shine—The Vulcan Vizor.

The Jenkins Vulcan Spring Co., of Richmond, Ind., announces a new windshield vizor adaptable to any car. The Vulcan vizor, as it is called, is to be had in three types. Each fits solidly over the windshield in such a manner as to shield the eyes of the driver from the sun, headlight glare, or mist.

Features of the vizor include a gutter at the front edge, which drains off the rain that would otherwise strike the windshield. The vizor's construction causes it to harmonize with the car to such an extent that it appears to be an integral part of the car itself rather than an addition. It is a one-piece job of rolled steel, finished with baked black enamel, and it is said that it cannot rattle or work loose.

Type A is exclusively for cars having straight fronts. Type B is an adjustable vizor for all open cars, folding back incon-



Tread Changed by Addition of Extra Non-Skid Features and Entire Tread Widened.

spicuously into the top when the top is lowered. Type C is designed to fit any closed car, irrespective of the windshield slant.

These vizors are now ready for distribution through the jobbing trade.

BURD

Quick Seating

PISTON RINGS



The ORIGINAL Quick Seating Ring

The Burd Quick-Seating Piston Ring was designed to meet the demand for an efficient piston ring having the quick seating feature of a narrow ring, with the wall tension of a wide ring.

The invention of this entirely new type of piston ring is the greatest advance which has been made in piston ring construction in the past ten years. It won the instant approval of mechanics everywhere, and has given such satisfactory results that millions of Burd Quick-Seating Piston Rings are now in successful operation in practically every type of engine.

A One-Piece Ring Easy to Install

The Burd Quick-Seating—is a one-piece, step-joint ring which fits accurately, and is very easy to install. The channel in the center carries an oil film, which prevents leakage during the process of seating—and insures perfect lubrication.

It is obvious to any mechanic—that when the Burd Quick-Seating Piston Ring is installed in worn cylinders, the outer edges will lap in more quickly, and conform more nearly to the contour of the cylinder wall, than any other type of piston ring.

Burd Piston Ring Directory Mailed FREE

Burd Quick-Seating Rings are installed to fit snugly—the points just meeting—no clearance between the points being necessary. They therefore, indicate the minimum opening, after seating has been accomplished.

Each individual casting is ground (not turned), to micrometric accuracy, the most critical dimensions being held to a tolerance as small as .00025 of an inch. They are exceptionally resilient, exert an unvaried wall pressure, and will not break down under cylinder heat conditions.

Burd Quick-Seating Piston Rings are made in all standard sizes—and over-diameter sizes—for practically every make and model of motor.

The outer surface—which comes in contact with the cylinder wall, has a channel .002 of an inch in depth in the center of the face, and raised edges, which lap in quickly, seating perfectly, with a hard glass-like surface, in harmony with the cylinder wall—almost immediately. It "goes to work" at once—adjusts itself quickly to the cylinder wall, and perfect seating is obtained in less than one-fifth the time required to seat other piston rings.

List Prices (Subject to Trade Discounts)
 All diameters to 4 inches, inclusive - - - - - 60c each
 All diameters over 4 inches to 5 inches inclusive - 70c each

Sold by All Jobbers—Everywhere

BURD HIGH COMPRESSION RING COMPANY, Rockford, Illinois, U. S. A.

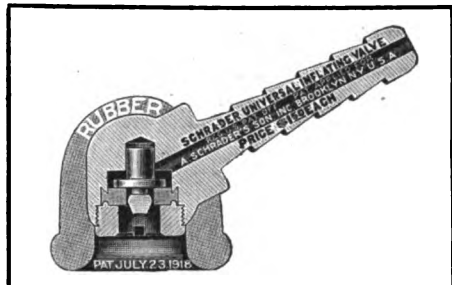
Sales Offices in the Following Cities:

Atlanta Baltimore Boston Chicago Philadelphia New York Kansas City Des Moines San Francisco Dallas Seattle Winnipeg
 Buffalo Cincinnati Detroit St. Louis Indianapolis Cleveland Minneapolis San Antonio Los Angeles

Further details may be obtained by writing to the Jenkins Vulcan Spring Co., Richmond, Ind. Please mention the American Garage & Auto Dealer when writing.

Another Aid to Making "Free Air" Profitable.

Good news may travel slowly sometimes, but it does arrive at last. Here is a piece of news about a device now being marketed by A. Schrader's Son, Inc., which probably



Automatic Device Which Conserves "Free Air."

will be new to many garagemen and is sure to be of much interest to them.

The Schrader automatic inflating valve is designed for the purpose of minimizing the loss to the garageman that is so often experienced on account of the carelessness of motorists in turning off the air after filling tires.

Unless the garageman has fitted the end of his pump-hose with a device which will automatically shut off the flow of air from the compressor, the air goes out into space without benefit to his customers and involves serious loss to him.

This automatic inflating valve consists of an air spigot or chuck with a safety-lock attachment. The flow of air is released by pressing the mouth of the spigot or chuck over the mouth of the tire valve, and the flow of air is shut off the moment the spigot or chuck and the tire valve are separated. Nothing is left to chance, as the mechanism is entirely automatic.

In pressing the inflating valve on the tire valve, the side walls of the tire valve push up the inflating valve plug, thereby letting the air come through. The inflating valve plug is so shaped that, in this operation, it projects into the valve stem only slightly or just enough to open the valve inside or tire valve core.

By this arrangement, there is no strain whatsoever on the valve inside, and there is absolutely no chance of jamming it down.

The valve is covered with a soft rubber covering which cushions any blow accidentally inflicted upon the coach-work or enamel of the car and prevents denting or scratching of the car.

Frequently the recoil, incident to the disconnecting of the tire and the pump, throws the end of the pump-hose violently against some part of the car, so that this protection which is given by the Schrader automatic inflating valve

is of the greatest importance and value.

Those interested in this excellent new device may obtain full details concerning it from A. Schrader's Son, Inc., Brooklyn, N. Y. Please mention the American Garage & Auto Dealer when writing.

"The Longer You Use Them, the Better They Get!"

"It's an ill wind that brings no business in," sang the blue-overalled mechanic cheerily, as he moved about the shop getting his tools ready for his day's work.

"Here's some to begin with," remarked the man in the dust-coat as he entered the shop. "And believe me, you're going to earn your money."

"How's that?" inquired the mechanic.

"Why, that dogged car of mine must have every ill known to motors if the troubles I've been having may be taken as symptoms," answered the customer.

"All right, friend. Let's have a look at it," and suiting action to words, the mechanic proceeded to give the car a thorough inspection.

"Um-um," commented he, as he finished, and wiped the dust and grime from his hands. "Just as I thought."

"Well," expectantly, "do I buy a new car, or just spend enough having this fixed up to buy a new one?"

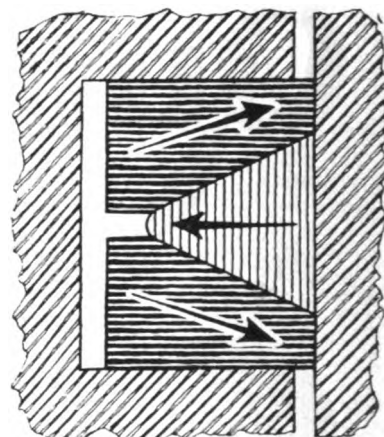
"Neither," smilingly. "There's only a small amount of repairwork needed, and then if you will let me install a set of V-Plex piston rings for you, your car will be in first-class shape and I'll guarantee you will get some real service from it. Better than that, you probably never will have to buy another set of rings for that motor, for the longer you use them the better they get."

"Let me tell you how these rings are made, and then you will understand why their manufacturer declares that they will

absolutely prevent leakage, oil pumping, slapping and wear on the side of the grooves."

Going to his neatly-arranged and well-stocked accessory shelves, he took from them a set of the V-Plex rings and brought them back to the car.

"Now look at this," he said, pointing to the wedge-shaped center ring, "This wedge



Note the Wedge-Shaped Center Ring.

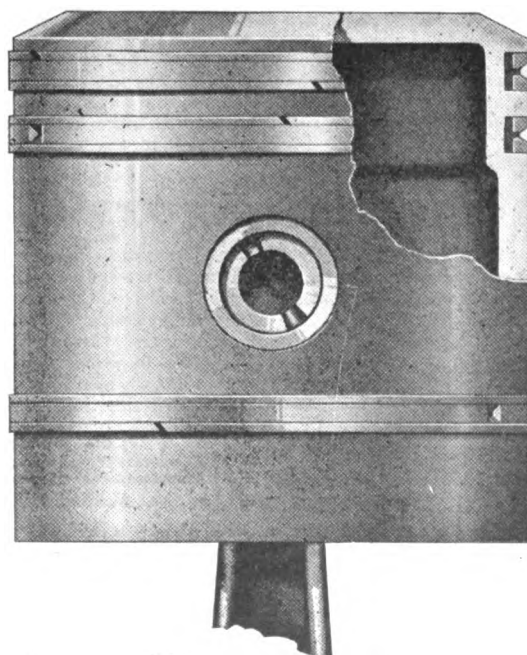
ring fits in between these two outer pressure rings and holds them firmly against the sides of their groove without impairing their action. Even after years of wear, a V-Plex ring fits the sides of the groove as perfectly as on the day it was installed. It automatically fills the groove and prevents leakage between the rings and the walls of the groove in the piston head.

"The second point of leakage is right here at the gap. The V-Plex ring is designed to seal the gap against all loss, since, as you see, each of its three sections is placed one-third of the way around the piston and forms a jointless ring.

The third point of loss occurs past the face of the ring, due to the improper seating on the cylinder wall. Because this ring is resilient and distributes its points of tension to different points of the cylinder wall, this loss is overcome. By placing the three sections one-third of the way around the piston, a uniform radial pressure is obtained, thus enabling the ring to conform to cylinders slightly worn out-of-round as well as those which expand out-of-round from the heat.

"With all this, you will get excellent compression, increased power, and proper distribution of your lubricating oil, as well as saving on your gasoline.

"As years of service wear down the edges that fit snugly against the cylinder wall, the rings slide a little farther out of the groove, but the 60-degree angle of the wedge-shaped center ring keeps both outer rings firmly against the walls of the groove with both sides parallel. It is a self-adjusting ring constructed to wear in all directions. The three rings are placed in the groove with their slots staggered, so that there can not be a gap in the ring.



V-Plex Ring Fits Sides of Groove Perfectly.

"PEP"

It's the Peppy Saying written on the big Boy and Slate Sign that puts speed into your Gas Sales, as well as in all other En-ar-co Products



HERE'S the sign that puts "pep" into your "get-away," gives you a quick "pick-up" in sales and enables you to maintain a speed in business that will soon out-distance them all.

The Boy and Slate sign gets the attention. It's Big—(over six feet high). It's attractively painted in four colors; it's cut out all around; it's made so you can set it at the curb or wherever it will get the most attention. Every other day you chalk in a new saying on the big slate. We supply enough of these sayings to last a year. These sayings are clever, witty, interesting. People like 'em because there's a good laugh in 'em. They come around for more, and in so doing they buy White Rose Gasoline, En-ar-co Motor Oil and other En-ar-co Products.

This unusual sign has not only made a wonderful success for hundreds of dealers but it has made them popular as a wit. It has given to their places an air of

progressiveness that motorists like to patronize.

It's a winner. There's nothing like it.

How to Get This Sign

Write us for offer and full particulars about the "Boy and Slate" service and for prices and other selling helps on En-ar-co Motor Oil, En-ar-co Gear Compound and other En-ar-co brands. Remember we furnish the signs and enough slogans for the entire year. Get this offer—use the coupon.

THE NATIONAL REFINING CO.

National Headquarters, D-731 National Bldg., Cleveland, O.
4 Modern Refineries—100 Branch Offices

THE NATIONAL REFINING COMPANY D-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

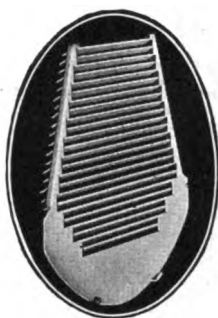
Address.....

City..... State.....

I now sell.....oil.

"So satisfactory have these rings proved that I have had several people stop in just to thank me for the good service they have gotten from their cars since I installed V-Plex rings for them."

"You can add another to the list if they



Hed-Lite Glare Deflector Affords Protection.

do for me all you say they have done for others," said the customer.

That man is a permanent customer now. "They all come back," says the mechanic proudly "when they find what the V-Plex rings will do for their cars because they say they think a fellow who sells them accessories that give the good service those rings give is the one they want to buy other supplies from."

The V-Plex rings are manufactured by the Krasberg Piston Ring Co., 536 Lake Shore Drive, Chicago, which will gladly supply those interested with full particulars concerning their product. C. A. Borden and R. A. Gray, of Milton, Wis., have just been appointed as distributors for the state of Wisconsin. Please mention the American Garage & Auto Dealer when writing.

The Trouble Light, or the Lamp with the Magnet Grip.

This is not a new movie or the title of the latest novel. It is a story containing

real facts, of good news for the motorist. The days of tinkering with your car, holding a light in one hand and working with the other—are over.

When stalled in the road on a dark night and trying to find out what is the matter with the machine, you will not have to grope around, drop the light you are holding, and be forced to cease operations.

What is known as the Magnet Lite, carrying a 6-candle power lamp, and protected by a stout, welded steel wire guard, has appeared to relieve the automobile owner of one of his most serious troubles. The lamp has as a base an electromagnet that sticks to any metal part of the car the instant the cord attached to the bulb is plugged in on the dashboard socket.

This cord is 12 feet long, which enables the motorist to take the light to any part of the car, rear or front, touch the base of the light to the fender, springs, or any other metal part of the automobile near where he wishes to work, and the light is there, as bright as day, and he can work with both hands.

When the motorist wishes to fix another part of his car, he presses a little button, which releases the magnet base, but does not put out the light. All the autoist has to do is to stick the magnet base on another part of the car to which he wishes to transfer his operations, and he has his illumination at the right spot.

It is said that the police department of Chicago was one of the first public organizations to use the Magnet Lite and that it is now a part of the regular equipment of the "Homicide Squad" car.

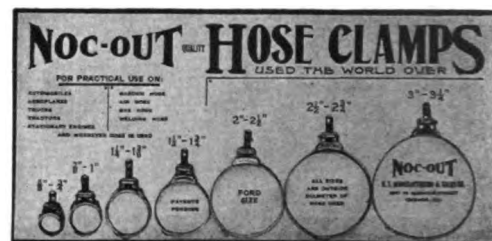
"What the motorist will appreciate most in this Magnet Lite," said Edward J. Post, president of the Magnet Light Company, 1509 S. Michigan avenue, "is the fact that both hands are free. The electromagnet base of the lamp will hold the light fast on any metal part of the car, thus enabling the motorist to have the use of both hands and work faster and better. Anyone who has been stalled on a dark night in a road far from home or a garage will appreciate what this means. The length of the cord permits one to work at any part of the car.

"The motor-boat man can utilize this Magnet Lite to the same advantage as the motorist on land. The Magnet Lite has both single and double contacts for either 6-8 or 12-16-volt storage battery."

Dealers! Have You Seen the Noc-Out Display Card?

An exceedingly attractive display card, which should prove of great value to dealers in making sales, is being offered by the R. T. Mfg. & Sales Co.

The graded sizes of the clamps are shown on the card and the many practical uses for them are named. This display



This Display Card Will Boost Sales.

card in your window will undoubtedly add materially to your sales.

Write the R. T. Mfg. & Sales Co., 3847 W. Madison St., Chicago, for further details, mentioning the American Garage & Auto Dealer when you write.

Protect Your Customers' Cars With Hed-Lite Glare Deflectors.

The great majority of automobile accidents at night are caused by the glare of automobile head lamps. If the headlights of your car glare, you are subject to arrest and may at any moment cause a serious accident to cars approaching, for which you are legally and morally responsible.

By this device, the glare is stopped without reduction in lighting efficiency by a set of deflecting vanes, so arranged that the direct rays—that is, those projected within the parallel beams of a correctly-focused lamp—are allowed to pass through, while all the upward slanting rays are deflected downward by the sloping vanes, thereby directing and intensifying all the light on the road.

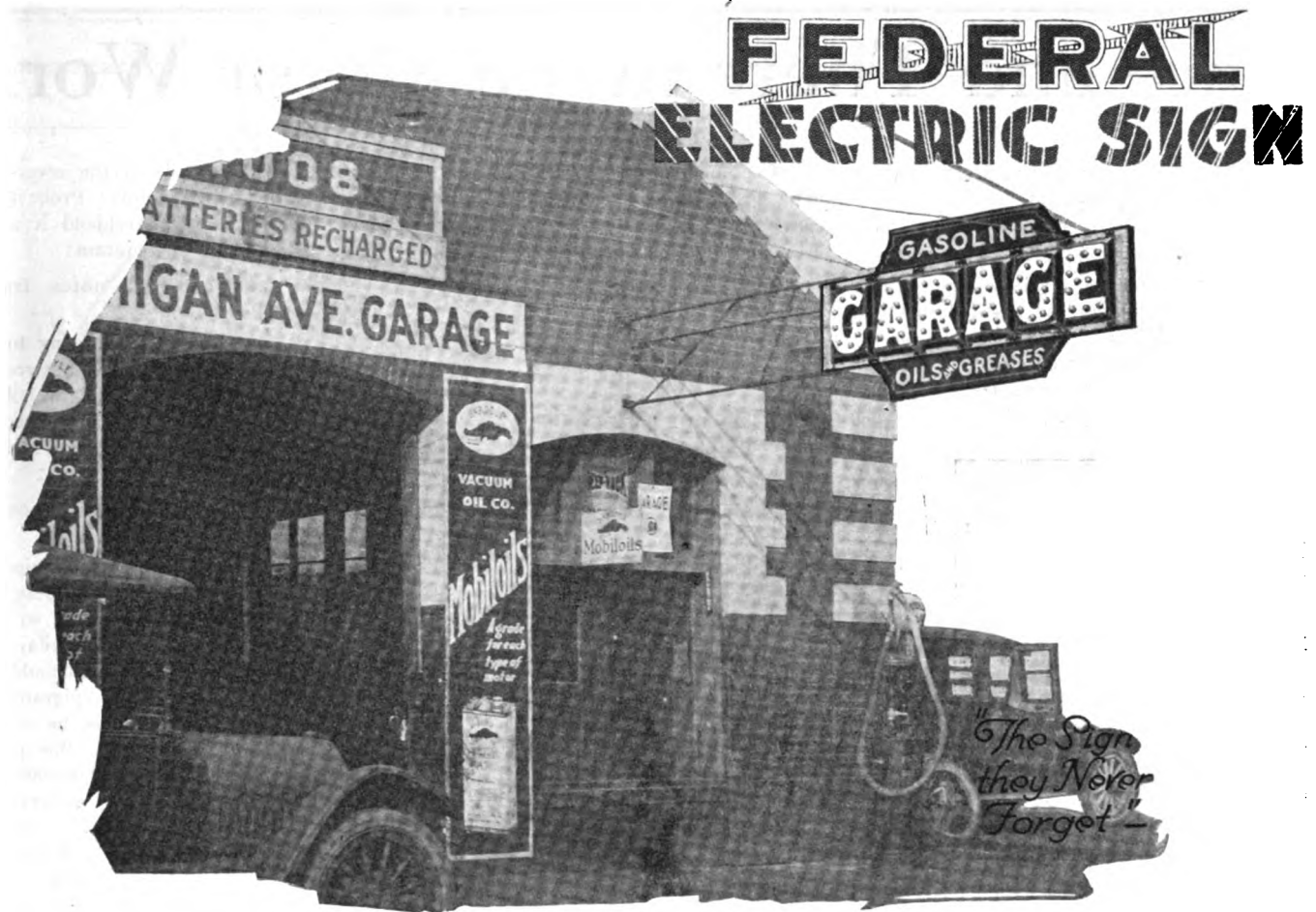
The Hed-Lite glare deflector is not a lens or a dimmer. It is a metal deflector or separator which the manufacturer claims will let the direct rays pass through without reducing their illuminating power and will stop illegal and often fatal glare by deflecting the spreading rays that cause such glare downwardly upon the road, thus increasing illumination instead of reducing it.

This device is easily and quickly installable by any car owner. It simply hooks on the back of the lens, and is secured in a manner that prevents rattling or slipping out of place. It is made in three sizes, to fit all lamps, and there is a special size for the Ford cars.

Hed-Lite glare deflectors are manufactured by the Pennypacker Co., 2210 Michigan Ave., Chicago, and sold to the trade through the regular channels. Write it for particulars, and don't forget to mention the American Garage & Auto Dealer.



The Lamp With the Magnet Grip.



—Inexpensive Advertising That Brings Results

Because their garages are lost in darkness, many garage owners lose many sales. Their competitors, with glittering electric signs lighting up their garage front, pull much of their paying profits away from them.

Prospective customers will not waste their time trying to find you. They know what they want and need and will go direct to that garage that advertises for their

patronage—a Federal Electric Sign draws them like a magnet.

And an electric sign is really the most inexpensive of advertising media. Costs but a few cents a day for electricity. Made of porcelain enameled steel—will not rot, rust or fade, and will last indefinitely.

Gain a step on competition. Send coupon today for full details, prices and **free sketch** showing how your sign will look.



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information **price and free sketch** of a **Porcelain-enameled Steel Sign** for my business. Explain your **12-months-to-pay Plan**.

Name City..... State.....

Street and No..... Business

Store Frontage..... No. of Floors.....

AGAD-6

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Here and There in the Motor World

New Manager for Schrader's Chicago Branch.

The policy of A. Schrader's Son, Inc., of advancing to positions of trust young men whom they have specially trained in their own organization has resulted in the appointment of Harry E. Geib to the post of manager of the Schrader Chicago office.

Mr. Geib entered the employ of the Schrader firm in March, 1916, as a junior



Unusual Executive Ability a Characteristic of Schrader's New Chicago Manager.

clerk in the accounting department. Upon evidence of unusual executive ability, he was transferred to the order department and from there was promoted to the assistant manager's office.

He enters upon his new duties after intensive training in this latter position, and is thus equipped to carry out the idea of efficient service to customers which is characteristic of the Schrader house.

Columbia Dry Batteries Drop in Price.

Announcement has been made by the National Carbon Co., Inc., Cleveland, Ohio, of a substantial reduction in the price of all standard types of Columbia dry batteries.

This reduction in price includes the following brands of dry cells and unit batteries manufactured by the company: Columbia Ignitor, Columbia Gray Label, Columbia Red Label dry cells, the Columbia Hot Shot, and Columbia multiple unit battery, and the new Columbia bell ringer battery.

The three barrel assortments, consisting of different combinations of Columbia Ignitor dry cells, Columbia Hot Shots, and Columbia bell ringer unit batteries, have also been included in the price reduction program. All new prices were effective as of June 1, 1921.

An extensive newspaper advertising campaign is being used by the National Carbon Co., Inc., to inform the public of the lower

cost of Columbia dry batteries. All Columbia dealers have also been supplied with a window poster announcing this fact.

At the time of going to press with this item, we have been informed by the National Carbon Co., Inc., that this reduction in price has greatly increased the demand for Columbia dry batteries.

Author of Boy and Slate Epigrams Tells How It's Done.

So popular have the Boy and Slate signs of the National Refining Co. become, that a great many people have wanted to know more about the originator of the clever epigrams carried on the slate.

The grinning boy face peering over the slate attracts the interest every time and the 'peppy' epigram sticks in one's memory.

Chas. L. Archbold, who is the author of these witticisms, says that he is constantly being asked some such questions as these: "Where do you get the ideas?" "Don't you ever run out of ideas?" "How do you do it?" etc., to all of which he replies that, having written several thousands of epigrams in the past 12 years, it has gotten so everything he sees suggests one.

Take the much discussed topic—prohibition. Here are a few of the ideas suggested to him by this subject:

Now it's the men who swap recipes.

We now have many unwise men of the (y) east.

Times are not hard because the drinks are soft.

His daily newspaper, with its death and accident toll, provoked these "safety" thoughts:

He who hesitates is hit.

Let the barber give pedestrians the close shaves.

Let the spark plugs do the sparking.

Keep on the right side—of traffic cops.

Safety first!

Then there's the ever present topic of rent raising. Mr. Archbold sums it up in the following:

The raisin' of the rent has the "kick."

The neighbor's phonograph, holidays, telephones—in fact, all the common, everyday conveniences and occurrences are fruitful sources for this versatile epigrammatist.

A small boy picked up a shoe horn, asked what it was and then how to blow it. To how many of us would this have meant

more than an example of the never-failing curiosity of a little child? Probably very few, and yet to Mr. Archbold it at once gave the idea for an epigram:

You can't get foot notes from a shoe horn.

One day a woman was running to catch a street car. She reached the street corner just in time to miss the car. All out of breath, she looked up and directly in front of her, on one of the Boy and Slate signs, she read:

Many run fast enough but not soon enough.

Probably that is one of the principal reasons for the great appeal of these signs. They are so human and describe so pithily the common experiences of everyday life.

But don't think that Mr. Archbold's sole occupation is the writing of epigrams. Far from it. In addition to this, he is editor of the National News, a monthly publication having a circulation of 1,000,000 copies a month among automobile owners.

He is editor of a similar publication, known as the Canadian Oil News, published in Canada. The En-ar-co Booster, an employees' house organ, also claims a portion of this busy man's time as its editor.

In addition, Mr. Archbold directs the publicity of the National Refining Co., which is a \$35,000,000 corporation.

Dealers everywhere are recognizing the pulling power of the En-ar-co signs as advertising mediums. There are two of them at the very "top of the world"—the most northern trading post of the Hudson Bay companies at the mouth of the McKenzie River on the Arctic ocean. They carry a universal appeal. Among the Illinois dealers who have placed the Boy and Slate sign in front of their places of business are: Lingle & Son, Irving, Ill.; Millard Tire &



His Smiling Face and Quaint Sayings Meet You Everywhere.

Supply Co., 82 N. Cherry St., Galesburg, Ill.; Owl Motors Co., Kewanee, Ill.; L. B. Yeast, 217 E. Calhoun, Macomb, Ill.; No-rem & Wideman, 610 Court St., Ottawa, Ill.; A. S. Johnson Motor Co., Streator, Ill.



A receipt printed and issued by a National Cash Register —→

Benefits the customer:

The plainly printed figures of the amount on the receipt show that she has not been overcharged. She likes to buy in a store of this kind.

Helps the clerk:

It proves that he registered the right amount. The added and printed records inside the register give the clerk credit for the sale.

Protects the merchant:

He knows that to get the proper amount printed on the receipt, correct added and printed records must be made inside the register.

A National Cash Register is the only machine that prints and issues this kind of a receipt.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL

CASH REGISTER CO.

DAYTON, OHIO.

WE THANK YOU FOR YOUR PATRONAGE,
PLEASE CALL AGAIN

★ A -1.00 -0001 JUN 15-21

Star and Initial Amount Transaction Number Date

Brown & Stevens
General Merchandise

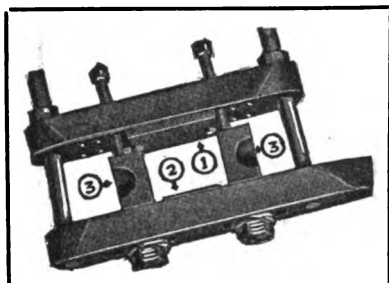
This receipt shows the amount of your
purchase

The register prints a record of the sale on the receipt. The star shows it was a cash sale. "A" is the clerk's initial. The amount is \$1.00. It was the first sale on June 15, 1921. The register also prints an advertisement of the merchant's store on the front and back of the receipt.

Up-to-the-Minute Garage Equipment

Looking for Efficient Shop Equipment? Read This!

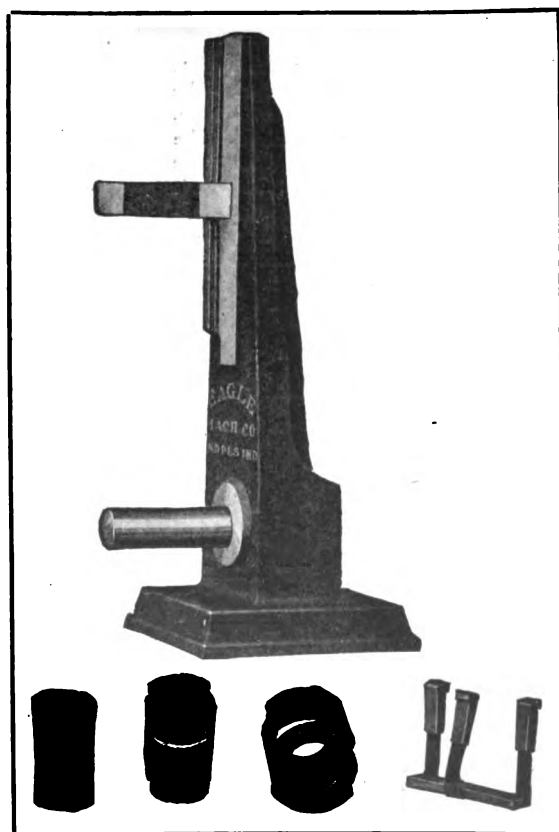
Have you seen the Atlas crankshaft grinder yet? If you are a repairman or garageman, you cannot afford not to know about this excellent tool. It's a real econ-



An Efficient and Speedy Crankshaft Grinder.
Only for fleet truck owners, service stations and garage repairshops.

Among the interesting features attributed to it are: That it will true up a crankshaft to less than one-thousandth of an inch in less than an hour without removing the shaft from the crankcase; that only one tool is needed, a new cutter being easily inserted when necessary; that it is adjustable to all crank pins from 1-3/16 to 2 1/2 inches in diameter. The Atlas special tool is 2 to 4 inches capacity.

The Atlas garage unit will also be of interest to garagemen and service stations.



Not a Twist or a Bend Does It Miss.

It consists of a 20-ton press for pressing gears, bushings and general garage work; a testing and straightening machine which will test and straighten accurately any shaft or axle to be repaired; an assembly stand which will hold the rear end and drive shaft housing and other large units for assembly; a V-jaw piston vise for holding round objects, such as pistons for assembly or other round pieces that cannot be held in the ordinary shop vise, which will hold any diameter from 2 inches up, the jaws having a heavy soft lining which can be renewed in a few minutes; and a test indicator which is a high-grade precision tool for detecting the slightest variation in any shaft down to a fraction of a thousandth.

These tools are manufactured by the Atlas Mfg. Co., Millvale Station, Dept. B., Pittsburgh, Pa., who will gladly supply further details upon request. When writing for information concerning these tools, please mention the American Garage & Auto Dealer.

You Just Can't Miss 'Em with the Eagle Tool.

High up among the clouds soared an eagle. A sudden swoop, a shrill scream, and it was over. As usual, the great bird's unerring eye had seen at once that which eyes less sharp failed to observe. So high had the eagle been that it seemed incredible that he could see the little animal below that had been marked by him as his prey.

Just as the sharp eyes of the king of birds never fail to mark their object, so is said to be the accuracy of this new aligning tool—the Eagle. With it, it is claimed that the slightest twist or bend in the connecting-rod or crooked hole in the piston is detected.

It is designed for the general garage trade, for use on all makes and sizes of motors, and is built to take care of all kinds of assembly work in a quick and accurate manner.

This aligning fixture is very complete, being equipped with three specially designed, patented bushings, which will fit all sizes of connecting-rod bearings from 1 1/4 ins. to 2 1/2 ins., and all intermediate sizes.

In actual operation, the connecting-rod bearing is clamped to the bushing as it is clamped to the crankshaft, and the bush-

ing is slipped onto the arbor of the fixture.

If the connecting-rod is twisted, the wrist-pin will touch on one side of the square and not on the other. A perfect rod will touch equally on both sides of the fixture.

The vise clamps in an ordinary vise may be used to straighten. It is said that this fixture is absolutely accurate and will give a perfect test.

For further details concerning this useful tool, write the Eagle Machine Co., 24 North Noble St., Indianapolis, Ind. When writing, please mention the American Garage & Auto Dealer.

Why Pump by Hand When You Can Have an Atsco?

"Gosh," said the road service man, as he mopped his face, "I'm the unluckiest guy that ever lived—I know I am."



Take It With You.

Unheeding the general laugh—for his hearers knew Hardy's tendency to class himself as the most unlucky of mortals on every possible occasion—he continued: "On three-fourths of the jobs I've had today, I've had to pump up tires and I had all the jobs I could take, too."

He had not noticed that Gray, the manager of

the service station, had quietly joined the group about him until Gray's voice caused him to turn in confusion to where his employer stood.

"Well," said Gray smiling, "I've a pleasant surprise for you, Hardy. I know it is tiresome filling tires by hand, and it takes too much valuable time as well. So I have ordered a couple of Atsco portable tanks for our road work."

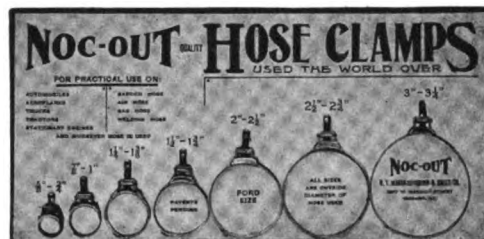
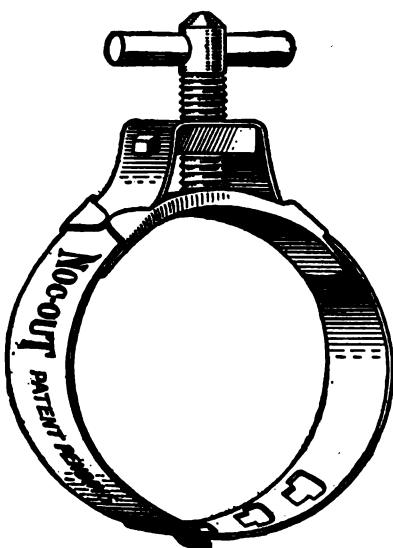
"Atsco?" questioned Hardy, "and what might that be, Mr. Gray?"

"The Atsco," answered Gray, "is a portable service tank which can be taken out with you in your emergency car to fill tires when making repairs on the road. The tank is ten inches in diameter by 36 inches long,

NOC-OUT HOSE CLAMPS

The latest invention in design and construction of hose clamps. Draws up evenly and will not cut nor buckle the hose. Our No. 6 fits the different sizes of hose used on a Ford.

Samples submitted on approval.



This display card is a very effective salesman

R. T. Manufacturing & Sales Co.

3847 W. Madison St., Chicago, Illinois

Factory: Green Bay, Wisconsin



DIRECTIONS FOR USING

Apply the end of the solder wire to the joint with a heated iron. The acid flows with the solder in just the right proportion, making a neat, permanent job.

"Shoot trouble" with Kester Acid-Core Wire Solder

The majority of troubles are due to loose connections. You are letting profits get away from you if your mechanics needlessly waste time hunting, preparing and applying a separate flux.

Give them KESTER Solder which contains both the flux and solder. They will save time—and do the job better!

Sold in one pound cartons and one, five and ten pound coils.

CHICAGO SOLDER CO.
4210 Wrightwood Ave. Chicago, Ill.

Are you from Missouri?

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

Company

Address

City State

Our Supply House is

good for a working pressure of 250 pounds per square inch, or a test pressure of 500 pounds.

"It is strong, light and easy to handle, and the manufacturer tells me that it will stand up to the rough handling it will receive in the emergency car. It is said to be constructed by a genuine copper-brazed process, which the manufacturer claims assures a tight, safe and strong tank.

"With the outfit is a standard tire-filling valve, protection cap for filling the tank from the regular connection on the storage tank, a heavy discharge valve to which is attached an eight-foot length of hose and an automatic valve for filling tires. The tank has a large handle on the side which is convenient for carrying:

"And they tell me it can all be done in less time than it takes to connect a hand pump."

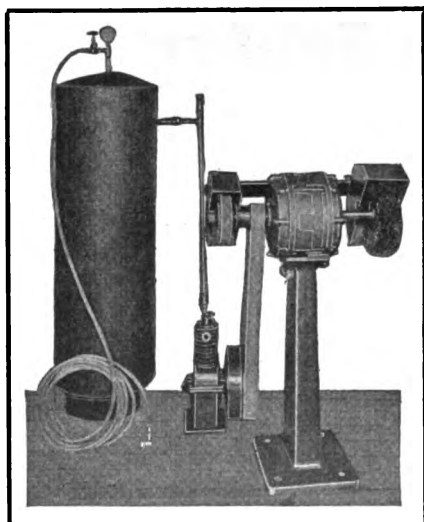
"No more excuse for loitering on the road, Hardy," laughed one of the workmen.

"Suits me," replied Hardy. "Now I'll be getting through sooner and with less work. Sounds like a mighty good proposition to me all right."

The Air-tight Steel Tank Co., Pittsburgh, Pa., which is the manufacturer of the Atsco portable service tank, also manufactures a line of gasoline tanks and pumps for garage use. Write it for its special bulletins, and be sure to mention the American Garage & Auto Dealer when you write.

The HB Ball-Bearing Electric Motors for Drive Shop Equipment.

Through the addition of a line of general-purpose ball-bearing electric motors, to its activities in electrical specialty manufacturing, the Hobart Bros. Co., has entered



Three Machines in One is Le Bron Outfit.

upon a program of greatly increased production.

The line will consist of high-grade motors of 1, 2, 3, 5, 7½ and 10 horsepower, for both alternating and direct current. All motors are ball-bearing equipped and are built of the best materials obtainable.

The company is in production in very good quantities and is able to make prompt delivery.

Production of electric motors will in no way interfere with the other manufacturing interests of Hobart Bros. Co., but will be conducted entirely independent of the established lines. Heretofore, it has been engaged exclusively in the manufacture of motor-generator battery charging sets, lighting generators, and similar specialties for garage and battery service station use.

For particulars of its new ball-bearing products, write to Hobart Bros. Co., Troy, Ohio. Trade prices and descriptive folders will be sent. Mention the American Garage & Auto Dealer when writing.

Le Bron "Three in One" Machine Promises Admirable Service.

Built to meet the needs of tire vulcanizers who want up-to-the-minute equipment, is the Le Bron electric buffing, grinding, and power machine.

This machine is complete with stand, motor, pulley, emery wheel, brush and guards. The manufacturer furnishes the buffing machine either with or without the air outfit which includes tank, air compressor, valves, air line, belting and in fact everything to make the equipment complete.

Special attention is called to the motor used on this equipment. It is enclosed and is guaranteed by the manufacturer to be absolutely dust and grit-proof. Even the oil which enters the bearings is first filtered through felt, so that it is impossible for dirt or cuttings from tires to get into the bearings or motor. The motor is guaranteed by the manufacturer for two years.

Another special feature of the machine is the small amount of floor space it occupies.

Single phase, 110, 220 or 440 volts, 2 horsepower and 3 horsepower motors and three-phase, 110, 220 or 440 volts, 2 horsepower, 3 horsepower and 5 horsepower motors are supplied.

For more complete details, write to the Le Bron Electrical Works, 318-320 S. 12th St., Omaha, Nebr. Mention this magazine when you are writing.

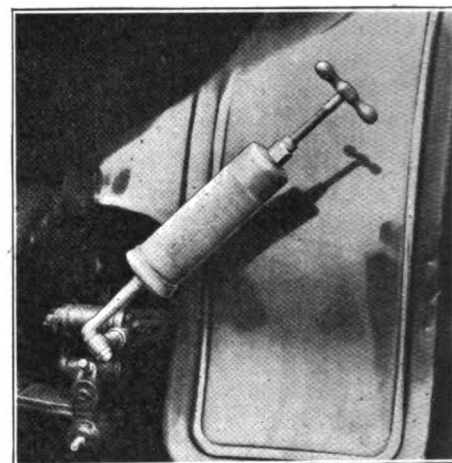
For Lubricating, the New GreesGun Is "On the Job."

The highest efficiency in car operation for your customers is, of course, what you are striving for. As lubrication is one of the most important items in car operation, it is constantly occupying a great deal of attention. Among the new accessories and parts being offered the trade, the GreesGun, marketed by Ireland & Matthews Mfg. Co., is receiving most favorable attention.

The GreesGun itself has several special features that add greatly to its convenience and serviceability. It is drawn from steel, finished in nickel. The cap is at the lower end, so the gun can be filled by the piston

action like an oil-gun. The capacity of the gun is sufficient for a number of greasings before refilling is necessary. The lower part of the gun swings almost a full circle, making it possible to get in places that are apparently inaccessible.

The nipples are furnished in several styles and threads, including straight 90 degrees and adapters for spring bolts with integral grease cups. All these nipples are made with ball-check valves so the grease can be left in the bearing under pressure,



Grees-Gun Offers Convenience and Service.

and no additional checks are needed on pumps or other parts where pressure is encountered. The balls form a tight joint, and no dust caps are required.

The GreesGun is provided with a check valve, also, so it is not necessary to relieve the pressure in the gun before breaking the connection with the nipple. This adds greatly to the speed, convenience and cleanliness of the greasing. It also makes it impossible for the gun to leak, even if put away under pressure and in a warm place, states the manufacturer.

No grease can be forced out of the gun except through a nipple. The locking device between gun and nipple is positive and simple. It requires only a quarter turn to lock and unlock, yet holds so tightly that it will support the weight of the gun.

A booklet "Positive Lubrication," issued by the makers, describes the system fully and will be sent on request by the Ireland & Matthews Mfg. Co., Detroit, Mich. When writing for copies, mention the American Garage & Auto Dealer.

New Catalog of Usaco "Merit Built" Air Compressors.

You will want the new catalog of the United States Air Compressor Co. It is a comprehensive and clean-cut little booklet—well illustrated—and will give you a fine idea of what Usaco products are.

"Usaco compressors are not merely inventions," states the company. "They are inventive evolutions." From the inception of an idea until it is placed on the market, months or even years may elapse, during which time it undergoes tests and experi-



The Big Names Are Featured in Oplex Signs

MOST of the best known trademarks of cars, tires and accessories have been reproduced in the form of Flexlume Oplex Electric Signs. This shows not only that the successful manufacturers realize the importance of electrical advertising, but that Oplex Electric Signs suit their needs.

Oplex Signs are the kind with the *raised* snow-white glass letters—perfect day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing an Oplex Electric Sign to meet the particular needs of your business.

FLEXLUME SIGN COMPANY, 25 Kail Street, Buffalo, N. Y.

Good Stock Keeping Is Just Good Bookkeeping

The basis of good bookkeeping is accuracy, both in putting facts on paper and in analyzing results. By the same token good stock keeping is nothing more or less than keeping results and using them as a guide in maintaining, replenishing and checking stock.

Burroughs Machines perform every detail of good bookkeeping and good stock keeping. They do it easily because the figures are in plain type. They do it accurately because there can't be mistakes in addition or subtraction, because the totals are automatically extended. They do it economically because they are always on the job, simple to operate, free from errors that mean wasted hours, and have practically unlimited capacity for work.

A Burroughs representative can give you valuable information about how other business men are getting automatic accuracy and labor saving into their accounting. Get in touch with the nearest Burroughs office or write direct to the Home Office at Detroit, Michigan.



Burroughs

ments to develop it. Frequently, parts are redesigned, new patterns and castings made, again and again, before the feature is adopted as a part of the Usaco line.

Usaco parts from special jigs, dies and tools under the highest automotive machine practice are made in a new factory fully equipped with every necessary machine and convenience.

In the new catalog Usaco two-stage air compressors are completely described. The two-range feature is claimed by the company to increase efficiency, reduce vibration to a minimum, and prolong the life of an outfit.

As the piston of the low-pressure cylinder of the two-stage compressor moves to the left, it draws in air at atmospheric pressure. On its return, this air is raised to 40 pounds pressure and forced through the ball-check valve and intercooler into the high-pressure cylinder. This constitutes the "first stage."

The high pressure piston then compresses the air a second time, raising it to a very high pressure, forcing this air through the

starting tank and check valve into the storage tank. This completes the second stage.

Among the noteworthy features of the two-stage equipment are the automatic controller, patented pressure unloader, and special lubrication system.

Motor-driven equipment, automatic plants, single-stage equipments and all others made by the company are described and illustrated in the catalog.

In addition to information concerning its products, the new catalog contains an air flow table, information regarding tire inflation, and a table for two-stage compression at altitudes.

Copies of this useful Usaco booklet can be obtained by writing to the United States Air Compressor Co. at Cleveland, O. Mention the American Garage & Auto Dealer when you are writing for copies.

Paragraphs.

HAYS MCFARLAND is the new sales manager of the Bassick Mfg. Co., Chicago. Mr. McFarland comes to the Bassick com-

pany from the Curtis Publishing Co., Chicago. Previous to his connection with the Curtis Publishing Co., he had handled automobile trade journal advertising and editorial work for Automobile Topics, had been in charge of the automobile advertising on the advertising staff of the Chicago Evening American, and was assistant business manager of the Chicago Herald & Examiner.

While acting as assistant business manager of the Chicago Herald & Examiner, he completely reorganized the motor delivery service of the Chicago Herald & Examiner and Chicago Evening American, forming a separate company known as the Garage Service Co. for the purchase and operation of the 80 some trucks that make up the Hearst fleet in Chicago.

W. L. CLARK Co., INC., New York, N. Y., manufacturers of the "Unitype" quick change bulletins, have recently removed to a new, modern, fireproof building in the heart of downtown New York.

This new building has been fitted out to meet the increasing needs of the company.

Harvey
RACINE
BOLTLESS
AUTOMOBILE
SPRINGS

Easy Riding
Guaranteed
HARVEY SPRING &
FORGING CO.
1046 17th Street
RACINE - WISCONSIN

KENNEDY
Auto Storage Covers
furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.
Made only by
THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.
Canadian Branch Factory at Woodstock, Ont.

Every Road a Boulevard
when a car is equipped with
"BULL DOG" BOUNCE ABSORBERS



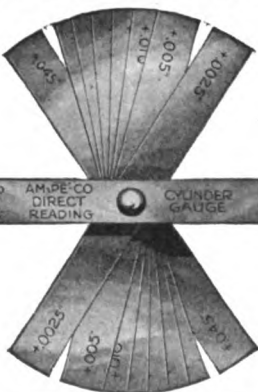
front and rear
\$24.00
Per pair
front or rear
\$12.00
Ford Model
\$16.00 per set

FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE. Easily attached; needs no oiling; has no metal parts that will wear or break.

JOBBER! DEALER! Write for liberal discounts.
CHANNON-HUGHSON COMPANY
225-231 West Erie Street CHICAGO, U. S. A.

You Don't Guess the Answer
You READ It on the Blade



Cylinder measurements guaranteed accurate to within .00025" and less.

The AM-PE-CO Direct Reading Cylinder Gauge

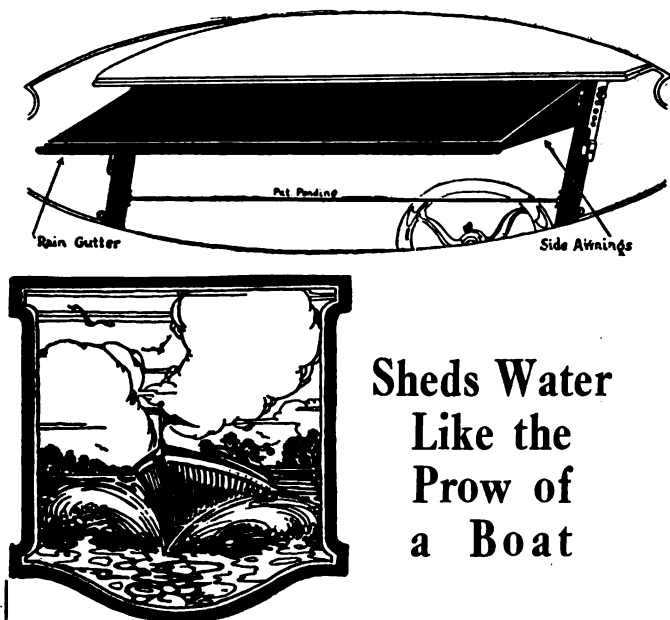
You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

Get the whole story in our circular.
PRICE \$2.50
AM-PE-CO SALES CO.
Marshalltown, Iowa

DEPENDABLE

The GARDNER is an air compressor that has over 60 years of reputation behind it. For complete information see our full page ads or send for illustrated circular in colors.

C. A. DICKERSON
614 Fisher Bldg. Chicago, Illinois



Sheds Water Like the Prow of a Boat

WHEN the ordinary visor gathers the rain on its top surface and drips it back on the windshield, the New Era catches it in its gutter along the lower edge and carries it to both ends where it pours it off in twin streams that the metal awnings, or "gable ends" stop and hurl back past the sides of the car, leaving the upper half of the windshield clear and free from water or snow—100% protection efficiency.

New Era Visors de Luxe are made of strong, light steel with black enamel baked (like body of car), on the outside and dull green underneath. Adjustable when installed to height of driver's eyes to shield them effectively from the glare of sun or approaching headlights. Write for circular.

Dealers: New Era Visors de Luxe afford unqualified satisfaction to the motorist, and being interchangeable between open and closed cars, they keep your stock investment low. Write for particulars.

List price: All cars—open or closed, sheet steel, **\$10.00.** Aluminum, **\$15.00.**

New Era Spring & Specialty Co.
56 Cottage Grove Ave. Grand Rapids, Mich.

NEW ERA
DeLuxe VISOR
all metal

A Real Selling Opportunity— And You Can Test It Now

RUSTSOLVO

THE PRODUCT WITH OVER A THOUSAND USES

Three Ways It Will Make Money FOR YOU

First—

By using RUSTSOLVO on repair jobs. RUSTSOLVO enables your repair men to turn out better work, in much less time, with less labor. Wherever metal parts are stuck by rust, paint, carbon, burned or dried grease, red or white lead, RUSTSOLVO will free them quickly and surely. No jerking or forcing with wrenches, no parts ruined by hammer and cold chisel. Your customers' satisfaction is increased when he gets his car several hours or days sooner than he expected.

Second—

By charging a fixed price for the job plus the cost for the RUSTSOLVO used on the work, charging from 25c up. This plan has worked out most successfully in the East. It gives you a handsome profit on every gallon of RUSTSOLVO so used, as well as satisfying the owner by giving him his car or truck promptly.

Third—

By putting RUSTSOLVO on your display counter for sale to the public. Our advertising campaign is rapidly educating the public to the great value of RUSTSOLVO and will be extended to cover the whole United States. Every car owner should have RUSTSOLVO ready as a part of his regular tool kit.

Sold on an Unconditional Guarantee

RUSTSOLVO is sold on an unconditional money-back guarantee. Both you and every customer you sell must be absolutely satisfied with the work RUSTSOLVO does. This means no risk on your part. It also means a quick turnover which you will appreciate more than ever right now.

RUSTSOLVO is a non-inflammable liquid with a pleasant odor. RUSTSOLVO cuts rust, carbon, burned or dried grease, red or white lead, paint, tar, or green corrosion on copper or brass. Positively does not injure the hands, metal, wood, cloth, leather, or rubber.

Make your own trial test now in your own shop. Prove by actual demonstration that it is the best rust getter you ever saw. Just pin the coupon to your letterhead and enclose a dollar. The dollar goes back to you if you say RUSTSOLVO fails to make good.

Prices on quantities as follows: 4 oz. 50c, 8 oz. 60c, pints \$1, qts. \$2, half gals. \$3.25, gals. \$6. Pints and over sent C. O. D. if you prefer. Ask for Dealer's Discount Sheet.

RUST PRODUCTS CO.
of America
64 East Lake St.—Chicago



PRINT name and address with SHARP PENCIL to insure prompt delivery

The Rust Products Co.,
64 E. Lake St.,
Dept. C-14, Chicago

I wish to take advantage of your special introductory offer on RUSTSOLVO. Please send me a full pint can by prepaid parcel post.

Mark out one line

I enclose P. O. Money Order for \$1.00, or Send the package C. O. D., \$1.00.

Also send free booklet on RUSTSOLVO USES.

NAME

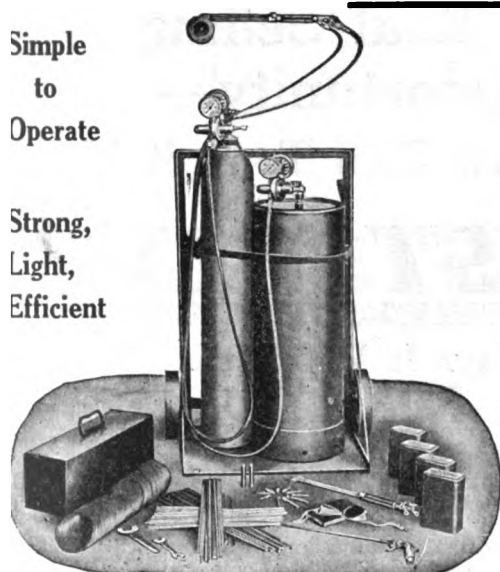
STREET

TOWN

STATE

Simple
to
Operate

Strong,
Light,
Efficient



Turning
the
Junk
Pile
Into
New
Money

Type "B" Dyer Welding, Cutting and Carbon Removing Outfit

25,000 Garage Men Use DYER Oxy-Acetylene Apparatus

You don't have to be an expert to repair frames, broken parts and radiators with the Dyer "B". It is the most advanced development in "fire tools" and saves many good cars from the scrap heap.

See your jobber or write to us for information

The Dyer Company, Cambridge, Mass.

Cut It Out, Brother, Cut It Out

Away with delay, the trouble and expense of repairing scored cylinders, cracked water jackets, aluminum cases, covers, and other aluminum and iron castings by old time methods. Old fashioned, expensive and unnecessary operations must give way to direct action.

F. A. A. CAST IRON AND ALUMINUM MENDS Go Straight to the Job



No Welding, No Re-Grinding, No New Pistons, No Warping or Cracking, No Waiting. Saves Dollars on Each Repair.

Send for Trial Order and Directions.

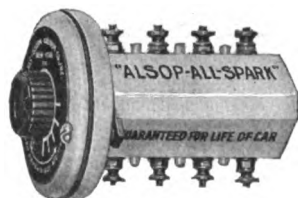
F. A. ALBERTUS AND CO.
206 9th St. MILWAUKEE, WIS.

Save \$135 a Year on your Ford
Much more on other cars and especially trucks

ALSOP-ALL-SPARK

Is an indispensable part of your car

YOU CANNOT AFFORD TO BE WITHOUT IT
Best by Government Tests. This simple little device does away with spark plug and carbon troubles.

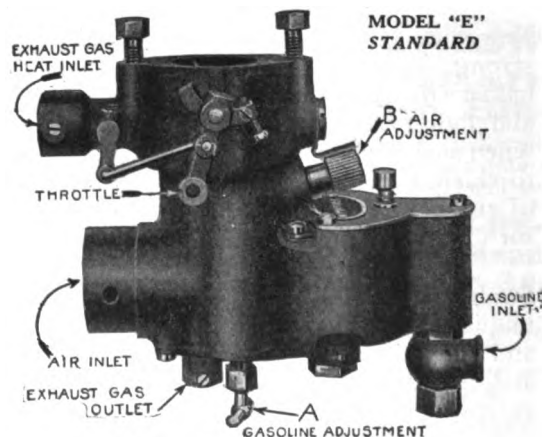


Saves gas, battery, oil, piston rings, repairs, depreciation, no overhauling on the road and many other advantages that spell car satisfaction. Send your order today—Circular on request.

Jobbers—Dealers—Agents Wanted

Cost complete, with money-back guarantee \$7.50

ALL-SPARK IGNITION CO.
13 Water St. New York City



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

VECO FORD MOTOR OVERHAULING STAND

MULTIPLIES PROFITS *on* FORD MOTOR REPAIRS

by greatly reducing the time required to do the work. The VECO is the only Ford Motor Stand which permits quick shifting of the motor from one position to another. The specially devised handle lock of the VECO can be operated with one hand, leaving the other free to swing the motor from one position to another.

An Outfit of Many Uses

The VECO Motor Overhauling Stand (shown in illustration) is an adjustable work bench, a bearing fitting machine and a connecting rod jig—all combined in a substantially constructed unit that takes up but little room in the shop. It is portable yet rigid.

Perfect bearing work in record time is done with the VECO. The long handles give ample leverage for reaming bearings.

This VECO outfit in your shop means MORE work, BETTER work and BIGGER profits.

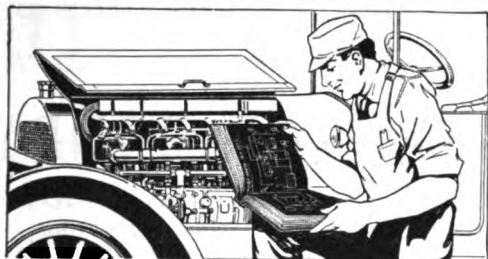
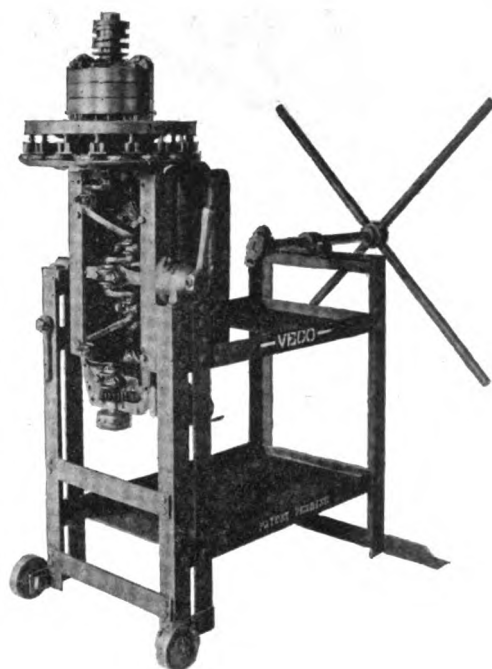
All VECO Equipment is sold under an iron-clad guarantee. Every machine is constructed of the best materials and is made by skilled mechanics.

SPECIAL PRICES—For quick action special discounts have been made on VECO EQUIPMENT. Write at once for complete data.

VAN TRUMP-ESELBEY CO.

1918 Cherry Street

Philadelphia, Pa.



Is A Wiring Job A Guessing Contest?

NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and stragglers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

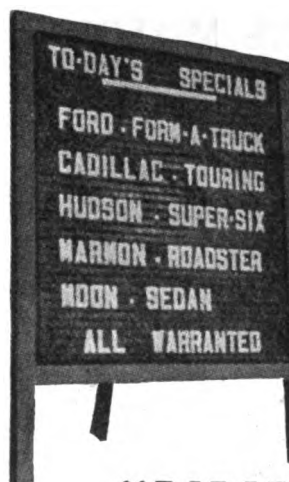
The Automotive Wiring Manual contains a wiring diagram of every model of every make of car or truck since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

The profits on the first half dozen jobs the Manual shows you how to do are more than enough to pay for it. The rest of its big dividends are velvet. And the price is only fifteen dollars, delivered anywhere. Put a check in an envelope and start it to us right now.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.
41 E. 29th St., New York

Suite 224, No. 18 Tremont St., BOSTON, MASS.
N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England. Motor Technique Bureau, 149 Strand, W. C. 2



We Sell Your Used Cars

—and you know it's the hardest problem in the business today to keep them from stacking up on your hands.

"UNITYPES"

actually sell them for you—besides they bring new customers off the street into **your** place—to **buy**—

You could afford to invest in ten or twenty of them,—but you don't need to—one or two will dress up your window and be live, silent salesmen as well.

In use all over the world.

Made in many styles and at prices from \$3.50 up.

Ask for catalog "A. G.-20" applied to Auto Dealers.

W. L. CLARK COMPANY, Inc.

538 Pearl Street

New York

Patentees and Exclusive Makers.

There Is Money in CRANKSHAFT WORK

PROOF

(Are you interested in Profits
and satisfied customers?)

with
the
**WEBER
TOOL**

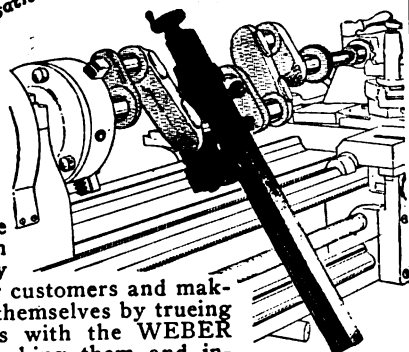
**SEND FOR
THIS BOOK~**
It will tell you.

How garages, machine shops and repairmen all over the country are saving money for customers and making more money for themselves by truing up worn crankshafts with the WEBER TOOL instead of junking them and installing new ones.

With one setting of the crankshaft on centers, you can turn all crank-pins with the WEBER TOOL absolutely round and straight to factory standards, spending not more than ten to twenty minutes per pin.

At your jobber or write direct.

SAWYER-WEBER TOOL MFG. CO.
356 So. Alameda St. Los Angeles, Cal.



GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

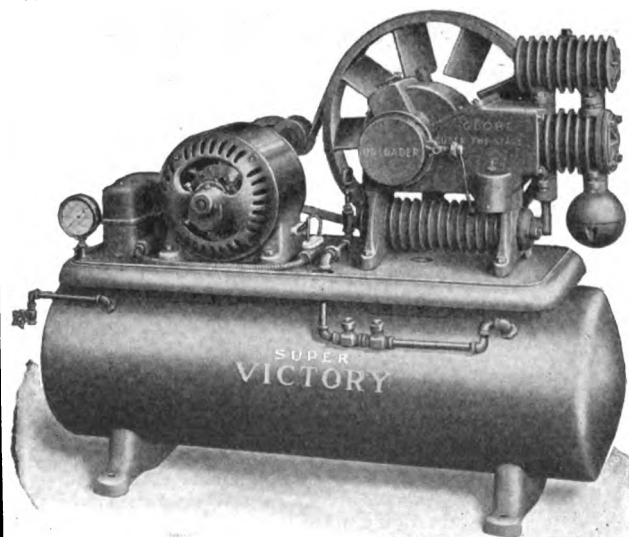
Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company

1002 Washington Boulevard
Chicago, Illinois



SUPER TWO-STAGE MOTOR- DRIVE COMPRESSOR UNIT



A NEW TYPE COMPRESSOR designed especially to handle Giant Pneumatic Tire Service and all other heavy-duty requirements up to 350 pounds.

Bulletin describing complete line of sizes and equipments on request.

GLOBE MANUFACTURING CO.
BATTLE CREEK, MICHIGAN

J. NEWTON BODDY

*Auditor, Accountant, Systematizer
Specialist in Automotive Accounting*

Audits, Investigations, Surveys, Systems
Income Tax Reports

Monthly Balance Sheets and
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Unit and Process Costs Established.

205 Metropolitan Bank Building
Phone Atlantic 5215
Minneapolis, Minn.

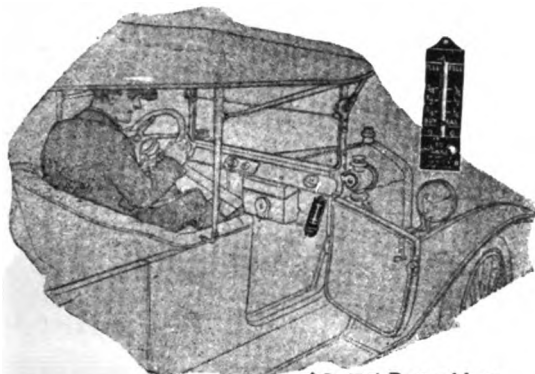
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*We Specialize in Systems for Automotive
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FACE-TO-FACE VISIBLE GASOLINE GAUGE

For Ford Cars!

The only scientifically correct and accurate gauge on the market. Registers in plain view of driver on dashboard. One of the most remarkable conveniences ever devised for Ford cars. Sold with unconditional money back guarantee.



\$3.75 Postpaid or
From Your Dealer

**No Wires—
No Spirals—
No Corks—
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No Impractical
Devices**

**Agents—Dealers—
Salesmen**

Write today for wholesale prices
and exclusive territories. Nation-
ally advertised. — Booklets and
Circulars furnished.

Leitch-Nelson Co., 222 W. Congress, Detroit, Mich.

GRAFF-O-OIL

Stops Spring Squeaks



Call the Spring Nurse

liquid carrier then vanishes and a coating of graphite is deposited between each leaf. This gives perfect lubrication that preserves the spring and affords noiseless, easy riding.

Removes Rust

Apply Graff-O-Oil to rust on metal anywhere and the rust will instantly dissolve—the metal will not be injured. It will quickly loosen the rustiest nuts on bolts. It saves time and temper and is a true economy. Graff-O-Oil has capillary action and will travel upward and thus reach places otherwise inaccessible.

It is indispensable to the Autoist, Garageman, the Shop—to use anywhere that rust collects. In the home it stops squeaks in hinges, locks, etc. In full pint can with special nozzle—\$1.00.

Send \$1.00 for sample can today. Liberal discounts to jobbers and dealers—write for full information.

THE GRAFF-O PRODUCTS CO.

1071 Parkwood Drive, Cleveland, O.

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



Set shown in illustration enjoys a well deserved popularity in the automotive field.

Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

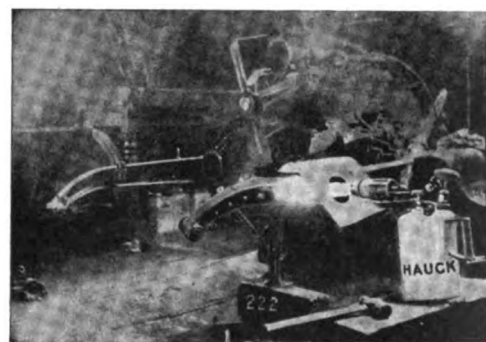
BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.



Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.

CHALLENGE BATTERY PLATES

(JOHNSTON PROCESS)

For all Standard Makes of Batteries.

Guaranteed Two Years
(when used with Challenge Separators)
None Better. By Service Test

Price 15c and up

Service Stations!! Be Wise!!

Build your own battery with CHALLENGE Plates and Separators and make larger profits.

Challenge! One hundred dollars' reward for a better plate chemically.

CHALLENGE BATTERY CO.

16 W. Illinois Street

Chicago, Ill.

For Those Who Know and Want the Best

REYNOLDS SPRING CO.

RED DIAMOND CUSHIONS

FOR FORD CARS

A Perfect Product for Particular People

Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.

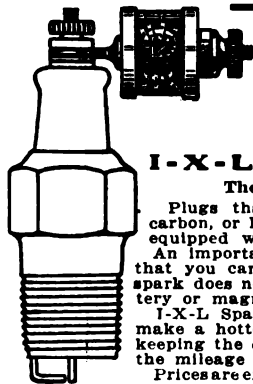
Sold thru regular channels only.

Manufacturers

The REYNOLDS SPRING Co.
JACKSON, MICHIGAN

Sales Dept.

THE ZINKE CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS



First Aid to Motor Ignition

When spark plugs are worn out or the insulation is broken there is still a lot of good service in them if equipped with

I-X-L Spark Plug Intensifiers

They overcome spark plug troubles

Plugs that have become fouled with grease or carbon, or have broken porcelains fire perfectly when equipped with them.

An important advantage of the I-X-L Intensifier is that you can see the spark from any angle. If the spark does not show the motorist knows that the battery or magneto is not delivering the proper current.

I-X-L Spark Plug Intensifiers are adjustable—they make a hotter explosion, increasing engine power and keeping the cylinders free from carbon. They increase the mileage on every gallon of gasoline used.

Prices are extremely moderate. Dealer profits are liberal.

Write today for full particulars.

UNIVERSAL MFG. & SALES CO.
550 W. Harrison St. Chicago



STOP AND DIRECTION INDICATOR

Protects all four corners of your car. You do not have to take your hands off the steering wheel to operate ARO.

AROS for the front of car are emerald green—those for rear are red. 21 C. P. Nitrogen bulbs make ARO equally effective night and day.

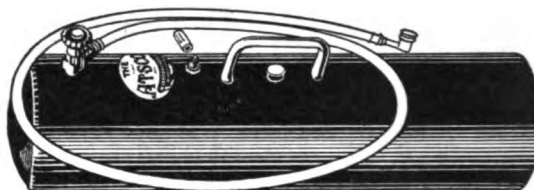
Makes motoring safer and more enjoyable.

Your customers will want ARO. Write for data.

THE W. J. SMITH CO.

1834 Broadway

New York, N. Y.



You Save Time With the ATSCO

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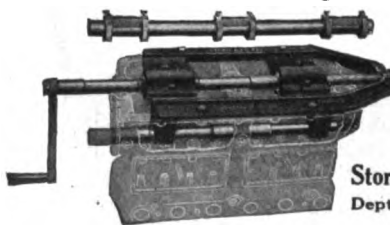
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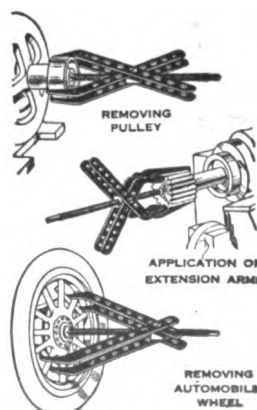
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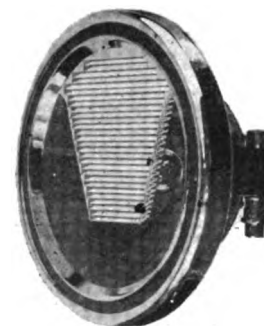
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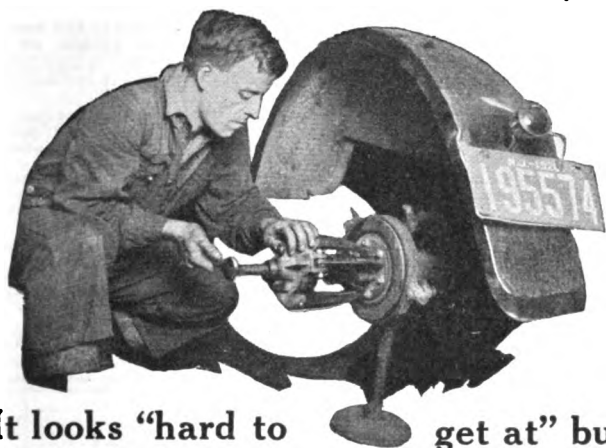
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WRENCHES

The Graham Roller Bearing Co., Coudersport, Pa.

Index to Advertisements

A	J
Accurate System & Manifold- ing Co., Inc.	Jenkins Vulcan Springs Co. 32-33
Air-Tight Steel Tank Co. 56	K
Albertus & Co., F. A. 52	Kastens, Henry
All-Spark Ignition Co. 52	Kennedy Car Liner & Bag Co. 50
All-Spring Shock Absorber Mfg. Co. 61	Krasberg Piston Ring Co. 61
American Bolt & Screw Case Co.	L
American Valve Tool Mfg. Co.	Laminated Shlm Co. 7
Am-pe-co Sales Co. 50	Leich Electric Co. 4
Atlas Auto Supply Co.	Leitch-Nelson Co. 55
Auto Specialties Mfg. Co. 5	Lewis Tool Co.
Automotive Publ. Co. 53	Loudon, Inc.
B	M
Bailey Co., Geo. D.	McDaniel Rubber Co., Leo.
Boddy, J. Newton. 54	Magnet Light Co., The. 37
Brewer Specialty Corp.	Marvel Carburetor Co. 52
Brunner Mfg. Co. 62	Marvel Machinery Co. 3
Burd High Compression Ring Co. 39	Motor Salvage Co. 58
Burgess-Norton Mfg. Co. 58	N
Burrroughs Adding Machine Co. 49	National Cash Register Co. 45
Butler Mfg. Co. 59	National Refining Co. 41
Butterfield & Co. 55	National Rubber Filler Co.
C	New Era Spring & Specialty Co. 51
Catelain, Andre G. 59	Northern Trading Corp.
Challenge Battery Co. 56	P
Champion Pneumatic Machin- ery Co. 6	Paro, H. G., Co. 5
Channon-Hughson Co. 50	Peerless Engineering Co.
Chicago Solder Co. 47	Pennypacker Co., The. 57
Clark Co., W. L. 53	Pick & Co., Albert.
Coffield Tire Protector Co.	Premier Electric Co. 56
Curran-Detroit Radiator Co.	R
Curtis Pneumatic Machinery Co. 85	Reynolds Spring Co. 56
D	Romort Mfg. Co. 57
Dearborn Equipment & Hinc- ley-Meyers Co.	Rose Mfg. Co., Frank. 56
Dickerson, C. A. 50	R. T. Mfg. & Sales Co. 47
Duntley, J. W.	Rust Products Co. 51
Dunton Co., The M. W.	S
Dyer Co., The. 52	Shaler Co., C. A. Front Cover
E	St. Paul Welding & Mfg. Co.
Eclipse Valve Grinder Co.	Sampson Electric Co. 59
Ever-Tyte Piston Ring Co.	Sawyer-Weber Tool Mfg. Co. 54
..... Inside Back Cover	Schrader's Son, Inc., A. 57
F	Slipon Co., The.
Fairbanks Co.	Smith Co., The W. J. 58
Farmers' National Life Insur- ance Co. 58	States Chemical Co. 8
Federal Electric Co. 43	Stiles Mfg. Co.
Finck & Co., W. M.	Storm Mfg. Co. 58
Flexlume Sign Co. 49	Sunderland Machinery & Sup- ply Co.
Foster Bros. Mfg. Co. 59	T
G	Tokheim Oil Tank & Pump Co.
Ganschow Co., William. 54	Trindl Co., The. 59
Garden City Spring Works. 59	Tungsten Mfg. Co.
Gem Novelty Co.	U
General Utility Co.	U. S. Air Compressor Co.
Globe Mfg. Co. 54	Universal Mfg. & Sales Co. 56
Graff-O Products Co. 56	V
Graham Roller Bearing Co., The.	Van Trump-Eselbey Co. 53
Grease Pump Mfg. Co., The.	Victory Oil Stove Co.
Greb Co. 57	W
Green Engineering Co. 58	Wagner Specialty Co. 59
Greenfield Tap & Die Corp.	Warshawsky & Co. 58
Greer College of Motoring. 58	Washburn Burner Corp.
H	Webber Co., P. H. 6
Harvey Spring & Forging Co. 50	Western Rubber Mold Co.
Hauck Mfg. Co. 55	W. H. S. Mfg. Co. 61
Heiser Special Tool Co.	Worcester Abrasive Co.
Hicken Sod-Tor-Lite Co., B. E. 59 Inside Front Cover
Hobart Bros. Co.	Z
	Zinke Co. 56 and 57

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\$25.00

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MINNEAPOLIS, MINN. U. S. A.

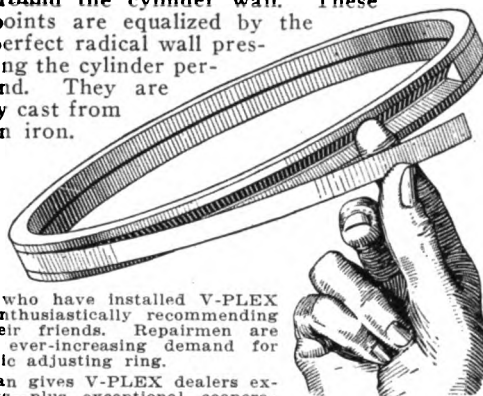
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V-Plex Piston Rings

A New Principle That Keeps the Gas-Tight Seal Intact

is embodied in the V-PLEX Piston Ring. Their construction also keeps down gas, oil and repair bills. V-PLEX Rings have six pressure points **evenly distributed** around the cylinder wall. These pressure points are equalized by the V-PLEX perfect radical wall pressure, wearing the cylinder perfectly round. They are individually cast from pure, virgin iron.

**Sell the
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that every
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boosting**



Car owners who have installed V-PLEX Rings are enthusiastically recommending them to their friends. Repairmen are showing an ever-increasing demand for this automatic adjusting ring.

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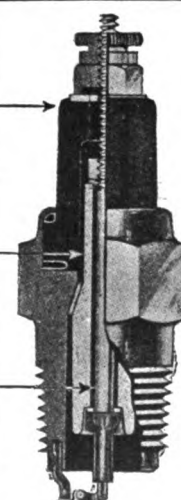
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ELIMINATES
ACCIDENTAL
BREAKAGE

ELIMINATES
BREAKAGE DUE
TO OPPOSITE
TEMPERATURES

ELIMINATES
CRACKING &
BREAKAGE DUE
TO UNEQUAL
EXPANSIONS



DURABILT PLUGS SELL ON PERFORMANCE

The design and construction of these plugs are such that they have the ability to **STAND UP** in the severest service. The remarkable success of this plug is due entirely to its unusual performance. Dealers: write today for descriptive matter and prices.

W.H.S. MFG. CO.

INDIANAPOLIS IND.

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A single cylinder compressor is jerky unless run at excessive speed or equipped with heavy fly wheel. The Brunner two cylinder compressor divides the load between two cylinders of equal size. This even distribution reduces bearing stress and lessens vibration, resulting in smooth operation at sane speed with light flywheel.

The market type two stage machine requires just as much operating current as a single stage of the same capacity. The load is not evenly distributed in the usual two stage machine. Hence, it shows neither power economy nor equal durability.

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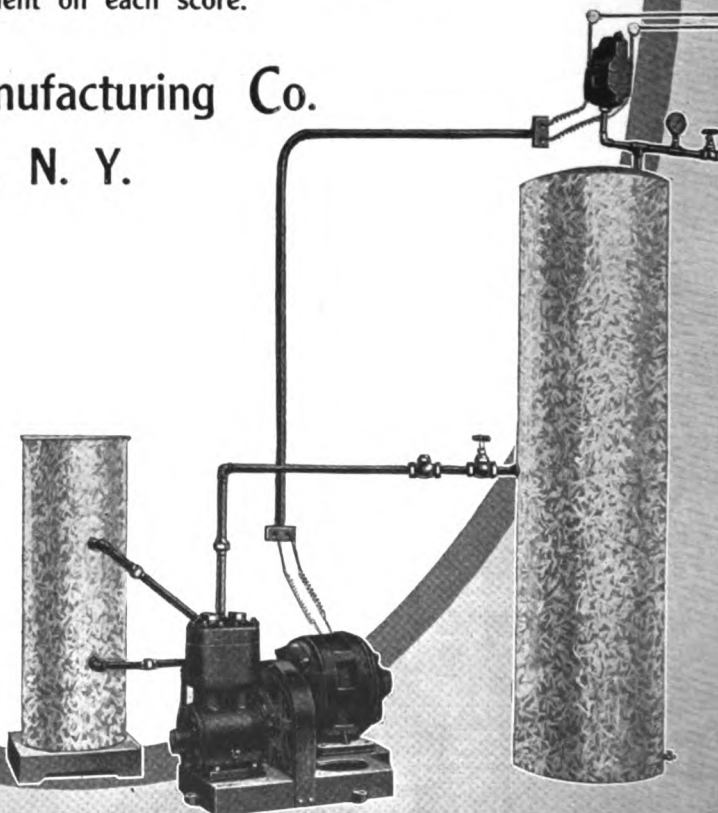
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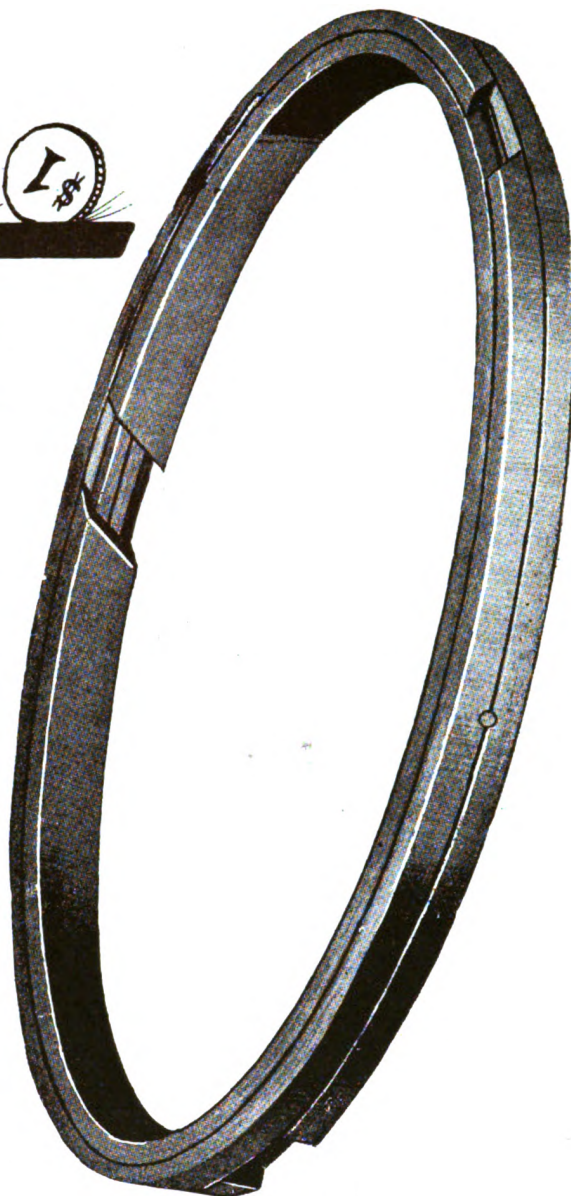
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Ever-Tyte
**The Piston Ring
for All Engines**



RICHARDSON SERVICE
R. E. RICHARDSON, Prop.
Magneto, Generator and Motor Repairing
Electrical Parts in Stock for All Systems
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Canton, Illinois.

June 10, 1921.
The Ever-Tyte Piston Ring Div.,
W.A.Z.S.Co.,
St. Louis, Mo.

Gentlemen:

After driving my model A-5
Essex automobile for about 3000 miles
it pumped oil and fouled spark plugs so
badly it was practically useless.

I installed Ever-Tyte Piston
Rings and I have not had a bit of spark
plug trouble since and all oil-pumping
has been eliminated. In addition great-
ly increased power. I get 20 miles per
gallon of gasoline whereas before I could
only get 16.

As the performance of Ever-Tyte in
this was so very satisfactory I installed
a set in a Dodge Car and obtained like
results.

Yours truly,

R.E. Richardson

EVER-TYTE PISTON RING DIVISION
WALTER A. ZELNICKER SUPPLY CO.
Wellston St. Louis

EVIDENCE BOOKLETS

5 VOLUMES

If you have received none, send
for one, stating kind of unit in
which you are interested.





**The more delicate the job—
the greater the necessity of**

NOKORODE



Reg. U. S. Pat. Off.

Soldered connections on a motor car or truck must be "just right" if they are to withstand the constant strain and vibration. Some of these joints are so small that they cannot be effectually made with the general run of soldering preparations. This is one of the reasons why NOKORODE is used by the big automotive manufacturers and thousands of repairmen.

Compounded with so much care that the smallest particle contains every element of the flux, NOKORODE lends security and perfection to the most delicate jobs. It is absolutely non-corrosive and harmless to metals.

**A trial will make you a NOKORODE
user. Sample and prices on request.**

**THE M. W. DUNTON CO.
PROVIDENCE, R. I., U. S. A.**

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

JULY, 1921

Vol. 17,—No. 7,
10 Cents the Copy,
\$1.00 Per Year.



Make Money NOW!

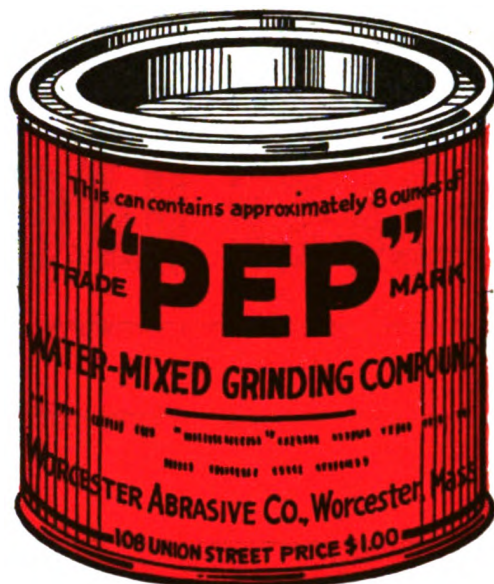
Sell This Popular Accessory

Every sale of a Shaler 5-Minute Vulcanizer is *more* than only one sale and one profit—it brings additional sales from the same customers, because they each need to buy the Patch-&-Heat Units regularly for use with the Shaler. This big repeat business comes to you—brings you regular profits—in addition to your profits from selling Shaler Vulcanizers—and without any effort on your part. Regardless of times or season, Shaler Vulcanizer sales bring steady repeat sale profits.

Write Quick for Window Display and Sales Helps

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Would you put grease on a file?

Then why put grease on a valve seat when grinding valves? It has the same effect in both places. It reduces friction when friction is what you want.

PEP contains no oil nor grease. This doubles your speed in valve grinding. It is a thick water-mixed paste, the only one which does not freeze nor dry out. Our patented formula fixes that. Patent No. 1,380,382. One grade starts and finishes any grinding job.

PEP has the clinching advantage that with it you can use distinctly more pressure on the valve than you ever dared use with an old-fashioned grease-mixed compound and get no ringing — no grooving. This re-doubles your speed. A little more pressure on some valves; fully double on others.

Big claims? Prove them for one cent. Send postal for free sample to

WORCESTER ABRASIVE COMPANY, Inc.
1664 BROADWAY NEW YORK CITY





The two-fisted scrapper with the equipment will get the business in 1921. Note that: "with the equipment"

Set a Romort Air and Water Station out in front of your shop to stand guard over your interest, and aggressively bring your service to public attention.

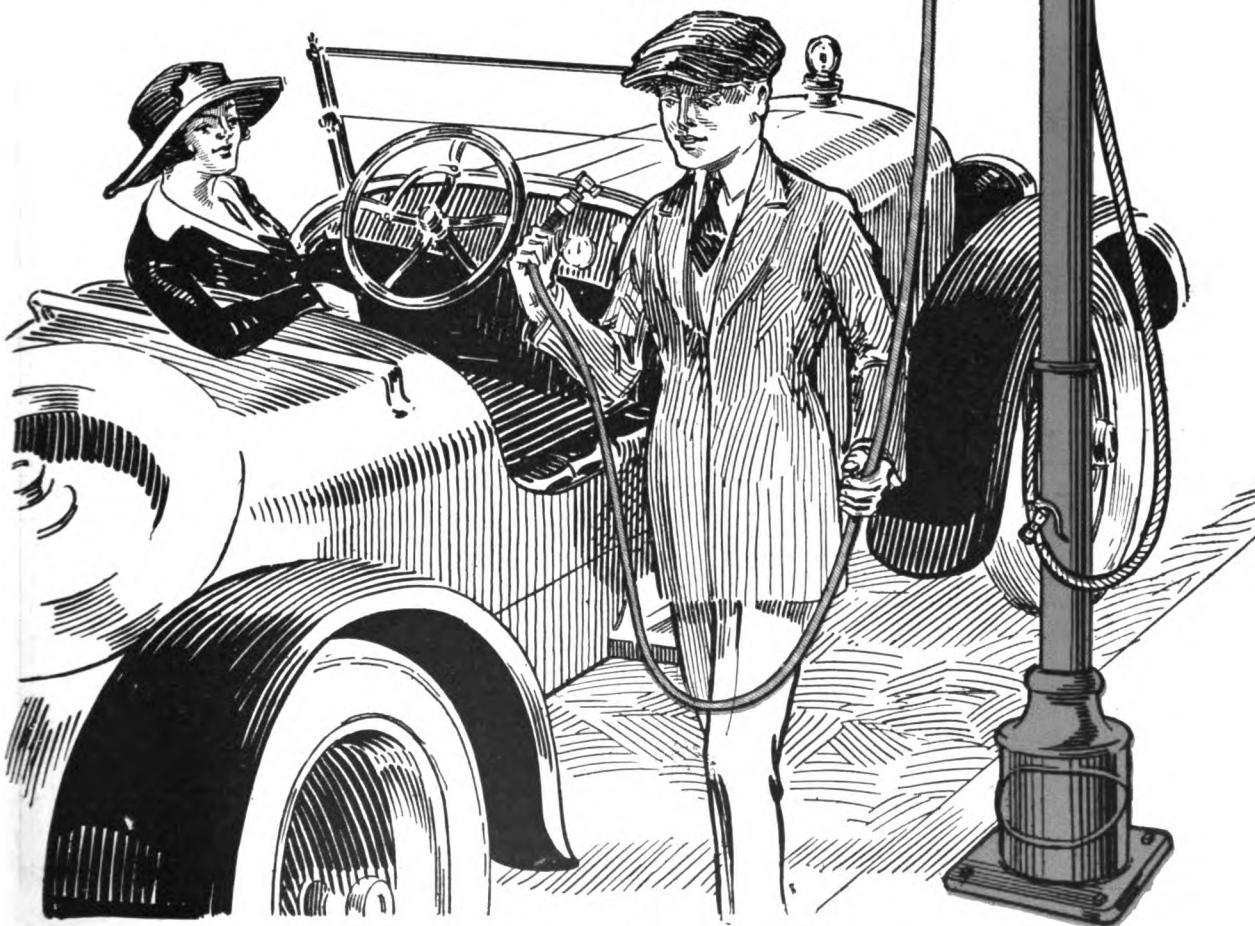
The Romort's convenience captivates, and the motorist who stops for free air soon becomes a buyer of your service and supplies.

You will get business out of a keenly competitive market by installing a Romort.

Write our sales department today for illustrated folders that show a type adapted exactly to your needs.

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Chicago, Illinois



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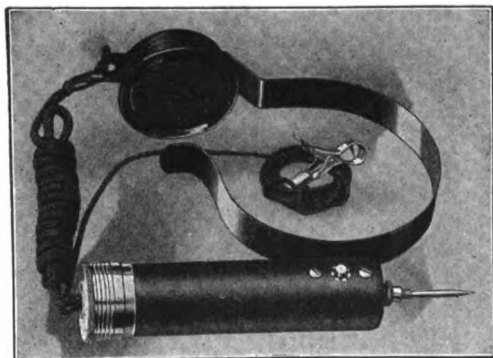


The SCOUT takes the guesswork out of electrical repairs

and eliminates a lot of costly experiments and wasted time. This inexpensive but dependable instrument will determine accurately the condition of any kind of electrical wiring. It is unexcelled for testing for shorts, grounds, and crosses. Any electrical trouble is readily located by the man with the SCOUT. It has proved a distinct time saver and helper on every phase of electrical work—manufacture, installation, inspection or repairs.

The SCOUT is entirely self-contained and is extremely compact and light—can be carried in your coat pocket. The source of testing current is a standard flashlight battery placed in the handle.

Every garage and repairman should be equipped with a SCOUT. It is just the thing for testing automotive wiring and saves most of the time usually required to locate trouble—thus increasing the profits on electrical repair jobs.



PRICE **\$6.50** ORDER
ONLY **TODAY**

LEICH ELECTRIC CO.
Manufacturers of RADD Spark Plugs
GENOA ILLINOIS

LEICH ELECTRIC CO.,
Genoa, Ill.

Please send me C. O. D. a "SCOUT" Testing Set. Price \$6.50.

Name _____

Address _____

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Reservoirs to Draw Upon.....	9
Volume and Profit.....	9
Develop "Businessality"	10
Business Making the Turn.....	10

GENERAL

Are You Getting the Tourist Business?, by C. M. Adams	11-12
Offsetting the Cost of Doing Business, by C. H. Thomas	12-13
Chick Kicks on Working Overtime, by Frank Farrington	16-17
Penlings from the Pen of Dike.....	17
Compensation and Safety Appliances, by Chesla C. Sherlock	19
Advantages of Burning-In Bearings, by J. N. Bagley	20-21-22
Legal Rulings of Interest to Garagemen.....	23
How Accessory Dealer May Increase Business, by Robert Livingstone	26
Glimpses in the Garageman's World.....	27-28
Facts and Ideas for the Tire Dealer.....	29

DEPARTMENTS

Accounting, by J. N. Boddy.....	14-15
Welding, Cutting and Brazing Practice, by David Baxter	24-25
Practical Hints for Shop Mechanics.....	30-31
Readers' Questions and Answers.....	32-33
Accessories—Dealers' Key to Profits.....	35-36-38
Up-to-the-Minute Garage Equipment.....	40-42-44-46
Here and There in the Motor World.....	48-50-52

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BEATS-ALL LIQUID RADIATOR CEMENT

Beats-All FOR **PROFIT
QUALITY
RELIABILITY
GUARANTEE**

FREE OFFER

Good Until September 1st, 1921

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Please send us **FREE OF CHARGE**

3 8 oz. cans Liquid Radiator
Cement @ \$0.50.....\$1.50
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Cement @ \$0.75..... 1.50

\$3.00

In consideration of these free goods,
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2 doz. 8 oz. BEATS-ALL Liquid
Radiator Cement..... 12.00
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Including free goods the above re-
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Goods to cost us..... 12.00

*Kindly Specify Jobber you want Goods
Shipped Thru.*

Seals Instantly and Permanently

"BEATS-ALL" Liquid Radiator Cement is a chemical compound that seals small leaks in water systems of automobiles, trucks, tractors, boilers, etc., and seals them instantly and permanently. **No Delay and loss of time and money.** "Beats-All" seeks the Leak and is positive in results. Use 2 oz. to each gal. of water Radiator contains.

"Beats-All" will not injure or corrode metal, nor will it in any way injure water connections or interfere with the circulation of water. Does not congeal in the radiator or water jackets. "Beats-All" will not repair or make a new radiator or water jacket that has large holes in them where the water flows out in large streams, but it repairs all small leaks promptly and efficiently.

Manufactured only by the
AUTO SPECIALTIES MFG. CO.
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Factories: Buffalo, N. Y.; Fort Erie, Can.

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THE PRODUCT WITH OVER A THOUSAND USES

CUTS RUST

Loosens the Parts that Stick

*A Wonderful
Selling
Opportunity*

In a few seconds or minutes a small quantity of RUSTSOLVO loosens any part, bolt or nut, crusted and stuck with rust.

Paint, carbon, burned or dried grease, red or white lead, green corrosion on brass or copper, even friction-bound parts, likewise yield to the penetrating action of RUSTSOLVO. Is non-inflammable and does not injure metal, rubber, wood, clothing or the hands.

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First—

By using RUSTSOLVO on repair jobs. RUSTSOLVO enables your repair men to turn out better work, in much less time, with less labor. Wherever metal parts are stuck by rust, paint, carbon, burned or dried grease, red or white lead, RUSTSOLVO will free them quickly and surely. No jerking or forcing with wrenches, no parts ruined by hammer and cold chisel. Your customer's satisfaction is increased when he gets his car several hours or days sooner than he expected.

Second—

By charging a fixed price for the job plus the cost for the RUSTSOLVO used on the work, charging from 25c up. This plan has worked out most successfully in the East. It gives you a handsome profit on every gallon of RUSTSOLVO so used, as well as satisfying the owner by giving him his car or truck promptly.

Third—

By putting RUSTSOLVO on your display counter for sale to the public. Our advertising campaign is rapidly educating the public to the great value of RUSTSOLVO and will be extended to cover the whole United States. Every car owner should have RUSTSOLVO ready as a part of his regular tool kit.

Sold on an Unconditional Guarantee

RUSTSOLVO is sold on an unconditional money-back guarantee. Both you and every customer you sell must be absolutely satisfied with the work RUSTSOLVO does. This means no risk on your part. It also means a quick turnover which you will appreciate more than ever right now.

Make your own trial test now in your own shop. Prove by actual demonstration that it is the best rust getter you ever saw. Just pin the coupon to your letterhead and enclose a dollar. The dollar goes back to you if you say RUSTSOLVO fails to make good.

Prices on quantities as follows: 4 oz. 50c, 8 oz. 60c, pints \$1, qts. \$2, half gals. \$3.25, gals. \$6. Pints and over sent C. O. D. if you prefer. Ask for Dealer's Discount Sheet.

RUST PRODUCTS CO. of America 64 East Lake Street—CHICAGO



PRINT name and address with **SHARP PENCIL**
to insure prompt delivery

The Rust Products Co.,
64 E. Lake St.,
Dept. C-22, Chicago

I wish to take advantage of your special introductory offer on RUSTSOLVO. Please send me a full pint can by prepaid parcel post.

Mark out one line

I enclose P. O. Money Order for \$1.00, or
Send the package C. O. D., \$1.00.

Also send free booklet on RUSTSOLVO
USES.

NAME
STREET
TOWN
STATE

Champion Equipment gives the biggest measure of satisfaction for the money

To that end we have developed CHAMPION Air Compressors to their present position of pre-dominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

Champion Pneumatic Machinery Company

1403 So. Michigan Ave

Chicago, Illinois



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

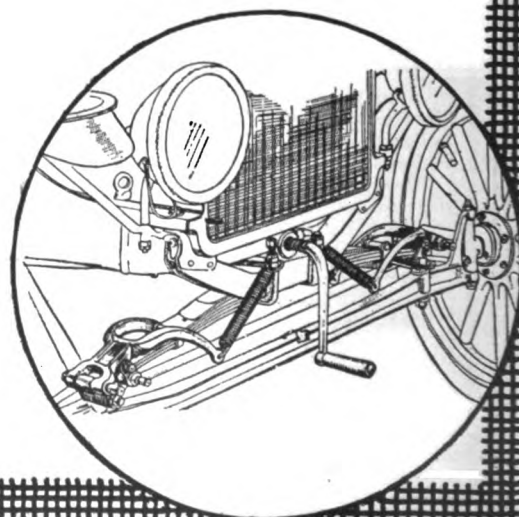
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada

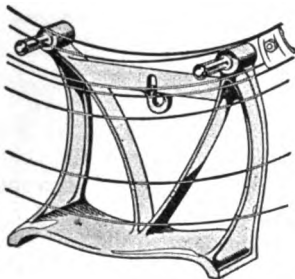




Lifts the Wheel in Seven Seconds for Tire Change

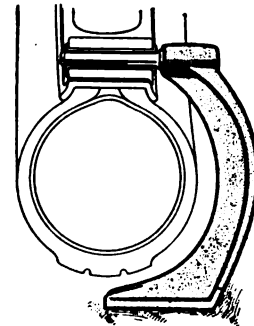
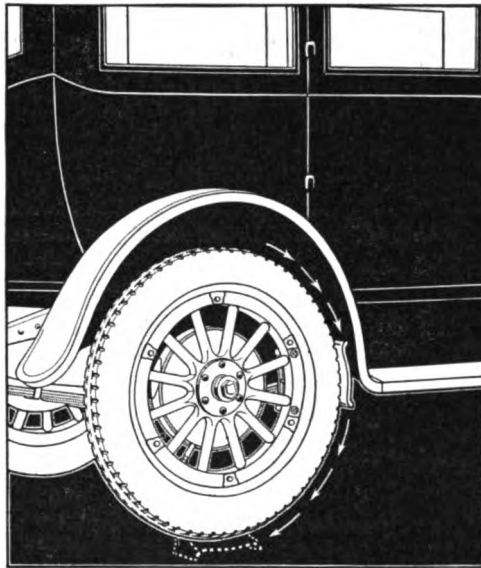


Simply insert the two pins of the Nojak into two holes in the felloe, which any garage can drill in all wheels in 20 minutes.



Made of malleable iron with cold rolled pins—in five sizes, from Ford to Packard. No loose parts—*tested to stand 4 times the weight required.

*Detroit Testing Laboratory



The Nojak stands behind the tire—not in front. Notice the big clearance around and under the tire. Wood felloes take brass bushings—steel felloes require none.

SAVES backache, time, clothes and temper. Also is a wonderful mud-hook and sand-hook. Also helps put chains on. Also acts as a guard over spare tire. It has 4 big uses.

The cleverest auto necessity in ten years. Endorsed by leading motor car and truck manufacturers. Officially used by Detroit city government. Nojaks sell fast in spite of present business conditions.

Dealer makes exceptional profits. The nationally advertised list prices are \$5 to \$8 (not installed). Write today for "Nojak Profits" booklet, containing complete prices, details and letters of endorsement.

COMMERCIAL MFG. CO.

Dept. E

1489 Fort Street East, Detroit, Mich.

Then drive ahead until the wheel rides up on the Nojak—that's all! Then the tire can be removed quickly as shown below. It's simple—isn't it?





Why so many motorists always carry SPEE-DEE

Every man who drives a car has to stop once in a while to make some repair or adjustment that leaves his hands soiled and greasy. Cold water won't remove this kind of grime and gasoline means chapped or cracked hands. But with the use of SPEE-DEE the grease and grime rolls off the hands leaving them soft and marvelously clean. No water necessary—no grit, acid or lye to injure the skin.

Just show your customer how SPEE-DEE will clean his hands and he will readily buy a can. He will find it useful for so many purposes that he will be back—again and again—for more. He must have it.

The price of SPEE-DEE is so moderate that all car owners can afford to use it freely. Yet the dealer profit is liberal.

**Write today for full details
and dealer selling helps.**

States Chemical Company
680 W. Austin Ave. Chicago, Ill.

SPEE-DEE

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 7.

CHICAGO

July, 1921

Reservoirs to Draw Upon.

Getting well along into July most encouraging reports are received from the automobile and tire factories. Practically all of them are employing more help than they did the early part of the year, and production is, in some cases, behind consumption.

Reports for the month of June indicate that cars are being purchased as a result of the sales effort made and the fact that people are now beginning to feel that prices are fairly well stabilized. It is to be noted that those manufacturers who early made radical cuts in prices are now experiencing a most satisfactory demand for their cars.

Quite generally throughout the country there is a decided feeling of optimism, and business men are studying conditions and laying the foundations for the business that is bound to result as the attitude of the public changes, as it is now changing, toward buying.

The inactivity in purchasing is not due to lack of money, for all reports indicate that there is plenty of it in the hands of the people. Only recently the statement was made by a prominent financial authority that 80 per cent of the Liberty Bonds are still in the hands of the original holders. This appears to be an unusually high percentage, but it is, however, unquestionably true that people have more money in their hands than they had a year ago.

In Chicago, state banks report a

gain in their savings deposits for April, May and June of \$10,834,000 compared with a gain of less than \$2,000,000 in a similar three months' period between January 3 and March 31. The national banks gained \$706,400 compared with a gain of \$181,900 between February 21 and April 28. Then we are told that the purchases of securities of small denominations

As I became acquainted with the manufacture of iron I was greatly surprised to find that the cost of each of the various processes was unknown. Until stock was taken and the books balanced at the end of the year the manufacturers were in total ignorance of results.

I felt as if we were moles burrowing in the dark. I insisted upon such a system of weighing and accounting being introduced throughout our works as would enable us to know our cost for each process.—Andrew Carnegie.

such as real estate mortgage bonds, now show a steady increase over those of preceding months.

All of this indicates that the people generally are not drawing upon their reserves, but are adding to them.

Another indication that reserves are untouched is the report that "gold" is not found in circulation in Gary and adjacent steel-producing cities. The foreigners in these places, it is explained, save gold, hoarding it in socks, the ground, and other places, to remain until a sufficient amount has accumulated to purchase a house or to go back to the old country for retirement. When hard times come and ready cash becomes exhausted, these

various savings deposits are drawn upon and the gold comes into circulation. And "gold" has not yet appeared in those cities.

With all fundamental conditions sound, as we are assured by economic authorities, bankers, and other financial men, it would seem that never before has the opportunity been so ripe for the exercise of real salesmanship as the present.

Reports received from those who are "getting the business" show that it is obtained on a basis of salesmanship, the result of careful preparation—and when real salesmanship is exercised, a sale invariably results. "1921 is rewarding the fighting salesman."

Volume and Profit.

In a business efficiently managed, it is possible to increase the profit without a corresponding rise in expenses. Greater volume—more rapid turnover, without adding to the overhead charge, is the means employed. The principle may be shown in this way.

A dealer is doing a business of \$20,000 a year, upon which he realizes a gross profit of 35 per cent. The overhead expense amounts to 25 per cent of his sales, which is close to the average in that business. We get his net profit in this manner:

Sales	\$20,000.00
	.35
Gross profit.....	\$ 7,000.00
Expenses (25 per cent on \$20,000)	5,000.00
Net profit.....	\$ 2,000.00

Now by increasing the volume of sales 10 per cent, without adding to the "overhead," we get the following result:

Sales	\$22,000.00
	.35
Gross profit.....	\$ 7,700.00
Expenses (remaining the same)	5,000.00
Net profit.....	\$ 2,700.00

From this analysis we see that there has been an increase of 35 per cent in net profits. The percentage cost of doing business, through stoppage of leaks and more efficient buying has been reduced 2.3 per cent, as expenses remain the same.

This simply means that the amount of money being consumed in overhead expenses was capable of producing a bigger volume of sales. This principle is being demonstrated in many successful stores today.

Dealers who keep records of their purchases and the amount of sales in different lines and by individual clerks, find that certain goods sell better than others; that some lines are entirely "dead" and are constantly adding to their cost through depreciation and by taking up shelf-room that could be used for salable goods.

By getting rid of these "stickers" and concentrating on the fast-selling lines, profits are increased and the percentage of "overhead" reduced.

The same store has proved this principle in competition with the department store. The fact that its space is limited is, in many ways, an advantage, since there is less danger of carrying too much stock.

By energetic handling of fast-selling lines and by keeping stock down to the minimum, a large volume of business is done at low cost.

Develop "Businessality."

"Why don't garagemen, particularly those in the smaller towns, develop more businessality?" asked one of our recent visitors. We asked him what he meant by "businessality," as it was a new expression to us.

"It's this," he explained, "we speak of a man developing his personality in order to be more successful. A man's personality usually fixes his standing in an organization or in a community, and according to the way it has been developed the opinion is favorable or unfavorable to him. Why should not

Initiative Overcomes All Obstacles.

Men who have become famous and successful in all walks of life have developed their sense of initiative to the same extent they have gained knowledge and then, what is most important, have applied that quality to real problems of life. Without this too uncommon quality, developed as it should be, many daily tasks and problems become complex, difficult, onerous and commonplace. But, these difficult tasks become easier to the individual showing initiative, because he or she leaves the beaten path and finds a better solution, gaining at the end of the day a reward of sheer personal happiness at having accomplished something worth while in spite of all obstacles.—Thomas E. Wilson.

the term 'businessality' be applied in the same way to a business as the term 'personality' is applied to a person?"

Think it over. Has your business a good "businessality?" That is, does it create a favorable impression the very first time a new patron comes in? Is he well received and do the surroundings please him, and are the accessories and service presented in such a manner as to create a favorable impression?

In other words, is the customer greeted with courtesy, provided with expert service, and up-to-the-minute accessories for his particular make of car? If he is, your garage has "businessality," which is just as distinctive and individual as your personality.

It takes time for most people to build up a pleasing personality, hence it will take time to build up a pleasing "businessality," but a pleasing "businessality" can be cashed in upon to just as great an extent as a pleasing personality. Try it and see! Personality counts in business and so does "businessality."

Business Making the Turn.

Here and there in many communities throughout the country is met the man who enthusiastically predicts that the country is in for a financial or commercial panic this fall. His predictions, however, have not a sound basis, as anyone who analyzes the situation can point out.

There are three prime factors in producing a financial panic—over-expansion of bank loans and commercial credits, heavy inventories of goods ready for consumption without a corresponding market, and the element of surprise which brings demoralization when these two conditions are realized.

These factors are not in evidence now, as those who have followed developments of the past year know. There has been a contraction in loans and credits and the financial situation is decidedly stronger than it was a year ago, the loans and investments of the federal reserve banks having declined something like 35 per cent during the past year.

Inventories have been substantially reduced over those of a year ago and there has been no over-production. Hence, the inventory position is a decidedly healthy one and one which augers well for the future.

So far as surprise being an element to produce a panic, it would be decidedly unreasonable to suggest such a thing after the year of depression and discouragement that has been experienced. Surprise is possible in the very early stages of depression but not in the later.

The feeling is growing stronger every week that we have passed the turning point and that business will be making gradual improvement some months before the year closes.

The farmers are feeling decidedly better than they did a few months ago. When the crops are harvested—and good ones are practically assured—the farmer will begin buying and thus the cycle of purchasing will be again commenced. This will start all the wheels of industry gradually going again.

Are You Getting the Tourist Business?

Some Instances Which Show the Other Fellow How to Get Some of the Good Business That He Is Missing Now—"Treat 'Em Right and They Will Tell Their Friends"—We Have Heard of Many Complaints Like Those Described Here

By C. M. Adams

The young man who had driven in the car with the jacked-up front wheel frowned, fidgeted, and glanced at his watch again. But the garageman went on fumbling aimlessly and indifferently in the box of patches.

He had fumbled like that with the jack until the young man had impatiently adjusted it himself, fumbled like that with the tire until the young man jerked it off, fumbled like that over locating the puncture until the young man found it himself, and now as he went on fumbling through the patches, the young man once more took matters into his own hands.

"Here!" he snapped, reaching for the box. "I might as well have done it myself in the first place!" and he slapped on the patch, inflated the tire, and climbed back into his car.

"Fifty cents," the garageman said stolidly, as the motor started.

The young man stared, then glared. "For doing your work?" he demanded.

"That's our regular price," the garagemen answered, still stolid.

The young man snorted in disgust. "There you are," he retorted, throwing a half dollar at the other. "But believe me, that's the last cent from me

The owner of the car nodded and shifted anxiously. It had not been a pleasant job, taking off the wheel, fishing out a sheared-off bolt, and anchoring a flapping strut-rod. Besides it was "The Fourth." "How much?" he asked, in a tone he tried to make casual, counting off three from the roll of bills in his pocket. It would be that at least he thought.

The mechanic smiled again. "Oh, fifty cents," he replied. Then, glancing at the license tags which were those of an adjoining state: "Been having a nice trip?"

The tourist blinked, then beamed.

"Fine!" he answered.

Then enthusiastically, "And if I find anybody in trouble I'll send 'em here. You know how to treat people white I'll say!"

Every garage, like a business establishment of any other sort, usually has a certain clientele, a more or less clearly defined class of patrons who come to it for services and accessories, and whose business the garage seeks to hold.

But during the last few years—the years in which thousand-mile cross-country motor trips have ceased to be subjects of first-page sensations—many garages, and particularly those along interstate and inter-sectional highways have, in varying degrees, found a new class of patrons passing their doors in steadily increasing numbers; namely, the tourists.

Of course, whether a tourist stops at a garage at all or not involves a certain element of chance, depending

on whether he happens to need service or accessories at that particular point in his trip—a chance, it might be noted, which can always be taken advantage of by skillfully placed roadside advertising. But the point here is not whether the tourist comes into the



A Good Way NOT to Get the Tourist Trade.

garage, but whether, once in, he comes back.

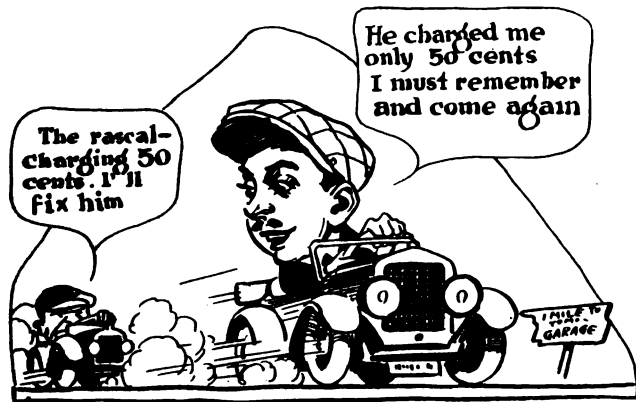
"No. They don't come back," a flock of garagemen will instantly rise to declare, and, after a little experience and testimony of experience, I am not surprised that they don't in many cases.

With all the respect due the garagemen who are honestly trying to give all patrons real service, far too many give the appearance at least of being guided by a "soak 'em while you've got a chance" motto whenever a dusty car with a foreign license-plate pulls into their establishments.

I don't mean that victimizing the tourist is the favorite pastime of anything like the majority of garagemen. On the contrary, I believe that most garagemen treat tourists with much the same courtesy and promptness they show local patrons who can be expected to return regularly.

But I do believe all garagemen will find it profitable to give the tourist business particular attention because it is a steadily increasing business, and one which depends so entirely on first impressions for its growth or continuity.

There is a feeling, probably justified



A Grateful Customer Returns—Or Sends His Friends.

or from my friends, you will ever get!" and he angrily backed his car out of the garage.

The mechanic straightened, wiped a smudge of grease smartly off the hubcap, and smiled. "I think that'll get you home all right," he said.

in some cases, among many who have taken cross-country trips, that garagemen have "seen them coming." Anything, which in any way gives rise to this feeling, is a short-sighted policy. Of course, the odds are rather heavily against any particular tourist returning for more service or accessories.

But the odds are a hundred times more heavily against any tourist saying nothing about the sort of treatment he received, and that is the thing which should make the garageman give this class of business more attention if for no other reason.

To refer to the instances cited at the outset, the young man who was forced to pay for work he had to do himself chanced to be not a cross-country tourist but one who lived only a few miles away.

The garageman, new to the locality, did not know him. This young man

passes that garage several times a week now, but he has not stopped there since that incident and several of his friends have followed his lead.

On the other hand, the tourist who was charged only 50 cents for work for which he expected to be charged at least \$3 is still talking enthusiastically about that garage, and whenever he hears of anyone taking a trip up in that direction he takes particular pains to recommend this establishment as a place where the tourist can get a square deal.

To cite an instance from a different line of business: While taking a trip with a friend a few years ago, we stopped at a restaurant one evening, hungry and tired, and were served delicious cherry pie (this was before the war) at five cents a slice, and since that time I have remembered that town for that restaurant first of all.

Often, to be sure, the tourist's nerves or bad temper are responsible for the dissatisfaction he charges against the garage. But when service stations at points in the mountains, where radiators frequently boil dry, charge 25 cents a quart for water, and when the price of gasoline is jumped as much as ten cents above market quotations because the tourist needs it to get to his next objective, it does seem time for garagemen throughout the country to get out the much battered and bent Golden Rule and apply it.

The tourist business is here, streaming past the doors of practically every garage in the country. But to get it inside, not once but a second and a third time, anything that smacks of the "soak 'em while you've got a chance" policy will have to be replaced by something that will bring better long-run results.

Offsetting the Cost of Doing Business

Keep Down Overhead and Add to Profits is Working Plan of Garage Where Each Department is Handled by a Specialist—Devotion to Business and Square Dealing Win Success for Cann Bros.—Night and Day Service Popular

By C. H. Thomas

At Kennett Square, Pa., which is located on Route 131 of the Pennsylvania state highway, is an establishment which is running full blast with plenty of work—and the four Cann brothers have kept this up in spite of prevailing hard times. Here is the way they did it:

Four divisions of this automobile business—repairs, storage, battery charging and taxi service—keep the four brothers and two repairmen busy all the time. There must be something about this place to draw the trade which it undoubtedly has attracted.

Take the battery service—if you are broken down out on the road and are towed in by Cann Brothers, many times a battery is gone. They have an efficient man at the head of this department who has a service battery to fit your car. For the nominal sum of 25 cents a day he installs a service battery, taking your old battery and recharging it (for \$1)

in one corner of the garage fitted up especially for this class of work.

This man is a specialist in this thing alone, having made a special study of batteries and, unlike so many who are jacks of all trades, he caters to those who are having battery trouble alone and lets the other brothers take care of repairs, etc. In this way, every department is run automatically and without friction and more work can thus be done and done right.

In the light repairshop several cars can be taken care of at one time. The two expert mechanics who have charge

of repairs under the supervision of Bert Cann, are known by many automobilists in this section for their careful, painstaking work on a car which has all sorts of things the matter with its insides.

Cann Brothers have established a reputation for square dealing. Their repair work has and will stand the test of time, and this is one great point which has tided them over many a dull season when other garagemen were waiting for cars which never came.

The night and day service in every department has many good points in its favor, and this alone has won them business which other garages have had to pass up simply because they were not open when business came to them. In these days, cars are on the way at all times of the day and night, especially on Route 131, which is a national highway in more than being a mere name. Hundreds of large touring cars pass through



A Busy Garage on Pennsylvania State Highway—Cann Brothers, Kennett Square, Pa.

this small town daily, in both directions.

By combining their business in the way they have, the Cann Brothers have been able to run things quite successfully without any chances of a mixup—and by concentrating on one thing alone, each brother has helped the others to make the whole a lasting success. Their devotion to the business has brought them the business they justly deserve. Any motorist who gets caught out on the road within any reasonable distance, and will call this garage, may rest assured that he will be well taken care of and will not get the black looks and slack talk which seems to characterize some so-called "modern" garages.

A large white card is used to handle the matter of repairs. When a car is brought in, the name of the customer, the name of the car, the ailment, and when promised, are written on one side. On the other side is written the names of the mechanic and his helper, and on this card they keep the record of their time as the job progresses.

Experimental Road As Solution of Trucking Problem.

All industry, and a great portion of the agricultural interests of the country, are up in arms against the hasty and ill-advised legislation already enacted by a few states and considered by others which threatens to strangle one of the nation's most essential industries—motor truck transportation, according to reports sent in to the travel and transport bureau of the B. F. Goodrich Rubber Co.

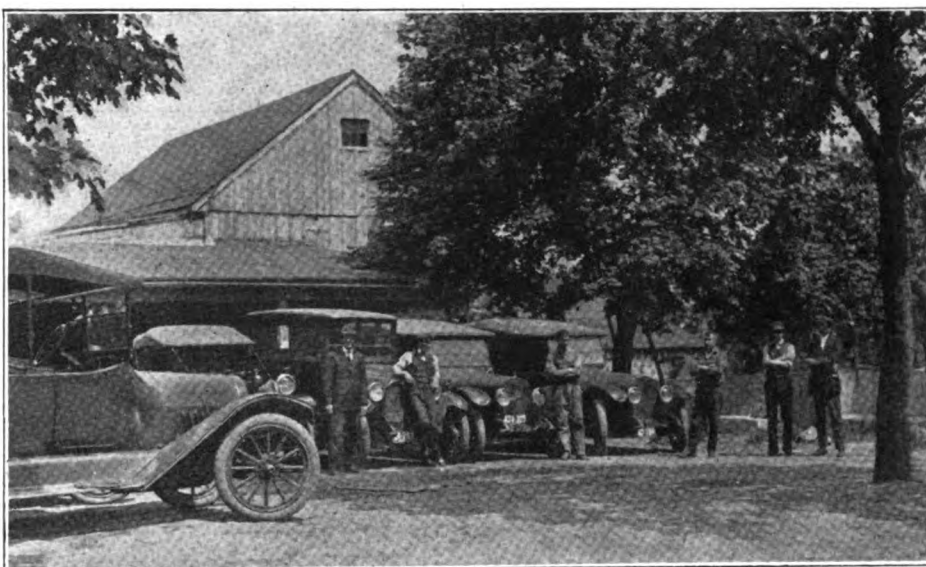
The protests come from highway engineers, dairy farmers, fruit and vegetable growers, grain belt shippers,

all lines of industry and commerce, and other operators of motor trucks and their patrons.

They say increased license fees and restrictive legislation have been effected without sufficient investigation

ships on shippers increases the cost of materials and food carried over the roads.

A sensible solution is being worked out by the state of Illinois. The state highway department has under con-



"Play Both Ends Against the Center"—Two Cann Brothers on Either End.

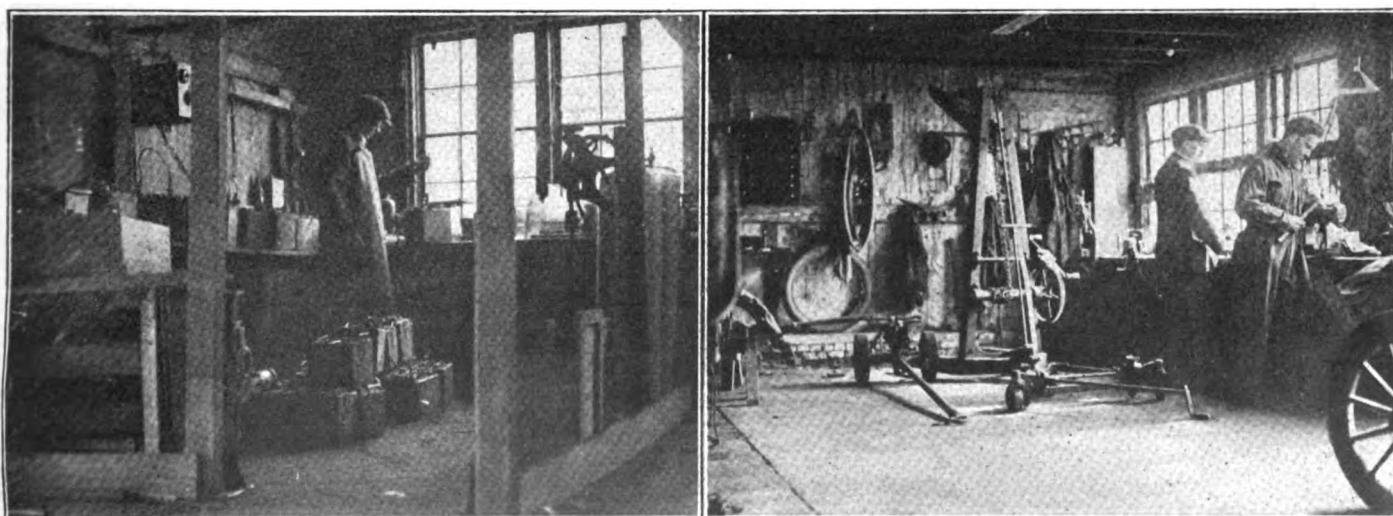
and without conclusive evidence. The trend of the new laws is to limit the gross weight of the truck and the load, which virtually prevents the use of five-ton trucks.

It is contended that this will fail in its purpose. These laws were introduced under the mistaken impression that trucks were entirely to blame for the failure of roads. The probable result in those states where legislation has been enacted will be the overloading of smaller sized trucks, which all engineers agree will have a more harmful effect on the roads than the same load on a truck designed to carry such a load.

Furthermore, increasing the hard-

struction an experimental road containing 64 test sections, each section differing from the others in design. The types of pavement used include macadam base with asphalt surface, macadam with brick top, concrete base with brick and asphalt top and regular concrete roads, both plain and reinforced.

This road is now practically completed but will be allowed to harden for several months. The testing will probably commence in the fall. The trials will consist of a passage of trucks over the road, first carrying light loads and then gradually increasing the loads. Equipment of all types will be used in making these tests.



Views in Cann Bros. Garage—Battery Repair Is Featured. Modern Tools and Equipment Facilitate Good Work.

Accounting:

This Article Discusses in Some Detail a Few of the Forms Which Are in General Use in Garage Accounting at the Present Time for Recording the Various Transactions Which Are Involved in the Purchase and Sales Accounts and the Methods of Posting to These Records

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting.

Sales Journal: All entries to the sales journal should come from sales tickets or invoices. As the invoice should be complete in detail, it is not necessary to show more than the ticket number in the sales journal to key the transaction. However, many garage owners like to have a detail record of their sales in their sales journal and, therefore, transcribe their sales to their sales journal.

Personally, we do not believe the supposed advantages of this method will compensate to any extent for the wasted effort in duplication. If sales tickets and invoices are properly filed, they make just as ready a reference as the sales journal.

It will be noted that the sales journal has been set up with a miscellaneous column to take care of extras. An alphabetical classification of departments as *A, B, C, D, E, F, G, H* and *I*, simplifies accounting procedure. As we wish to devise a uniform sales journal and, as no two garage-owners departmentize their business alike, we suggest this as a flexible method which may be used to indicate departments.

[illegible]

Sales Journal Offers a Detail Record of Sales.

In merchandise and service departments, a classification of 18 or 20 is quite possible. It will be found that

the number of departments suggested, alphabetically classified, will meet any but extraordinary needs.

For purpose of demonstration, the following classification may be used: *A*—gasolene, *B*—oil and grease, *C*—new cars, *D*—used cars, *E*—tires and tubes, *F*—parts, *G*—supplies and accessories, *H*—shop, *I*—storage. To these is added miscellaneous, to take care of infrequent sales or inactive departments.

The Purchase Journal: The purchase journal is the book which contains the daily record for all purchases. It is an elaborate form of invoice register. It is not thought advisable to record a purchase before the merchandise is received. Stamp each record as received. This stamp should provide the following data:

Date received.

Carrier.

Expense bill number.

Weight—rate—amount.

Over—short.

O. K.

How distributed.

Purchase journal—purchase ledger
--stock ledger.

[illegible]

Opposite Side of Sales Journal Page Shows Cost and Amount of Sales.

Let us suggest here that, for the average garage-owner, we believe an

[illegible]

For this reason, we always discourage the use of voucher registers except for a few lines of business. We certainly advise against the voucher system for the garage owner.

Many of your invoices will be for expense items; such as office supplies, shop supplies, outside labor, law and audit, subscriptions to trade journals,

The Opposite Side of Purchase Journal Page Shows Cost of Purchases.

[illegible]

Chick Kicks on Working Overtime

There's Moren One Way of Thinking About Working Overtime or Doing Moren Youre Reely Paid to Do—The Feller That Just Goes Along and Does Only What He's Told to Do Erns His Munny All Rite But He Dont Get Enny Better

By Frank Farrington

Deer Pete:

Gee, Pete, Ime dissappointed youd rather be a druggist clerk in old Pinkvill than work for our garaje over heer to Pike citty. Well the boss made you a good offer diddent he? And you can tell the boys what a regler first class garaje is like now. Ime glad you cum over but Ime sorry you went back. But that aint going to keep me from riting you same as ever.

Well the boss has dun marrid Dazie only I haddent awt to say Dazie enny more I spose. Now sheez Missis Hecker and Ile bet sheel be trying to boss us all around and get stuck up and act like a millyun dollers.

But that aint the worst thats hap-pened. That darnd Persy is back agen. The boss wants his mother to be nice to Da—I meen Missis Hecker so she can get to be a soshul lite, so he prommist to take Persy on for anuther trile. Good nite! I thawt we was rid of that vil-lage pest.

We bin kind of short handed for a wile. The boss and his wife was away on a wedding tower and Persy wasn't back yet, so the rest of us had to work longer and Bob was the boss wile the Boss was away. Everybody but Chick was willing to work overtime and do whatever had to be done, becaws we got a good boss and any feller likes to hav his boss hav a good time on his wedding tower and cum back and find everything all ok.

Well, we treet everybody alike in this garaje but theres sum fokes that spend a lot more munny heer than others, and we cant help but work a littel harder to pleez those. Theres J. B. Cortvelt. Heez got three or 4 cars and if he spends a doller in our place

in a yeer, he spends a 1000 of em. So when he cums in everybody just nach-urly sprooces up and steps lively—ev-erybody but Persy and sumtimes Chick. And Chick had one of his grouches on just about all the wile the boss was away.

So when old J. B. cum along about qwitting time the other nite and wanted to leev his seed Ann, and have the transmission draned and cleend and

drove it up to old J. B.'s. He diddent haf to do that and he new there was-sent enny tip in it becaws old J. B. may be a big spender for car fixins but he aint a tipper. That was why Chick was so cold about doing that ex-try work.

Well nobody sed ennything to the boss about that job and I dont kno as there was ennything to say, but when the boss got back he found a letter

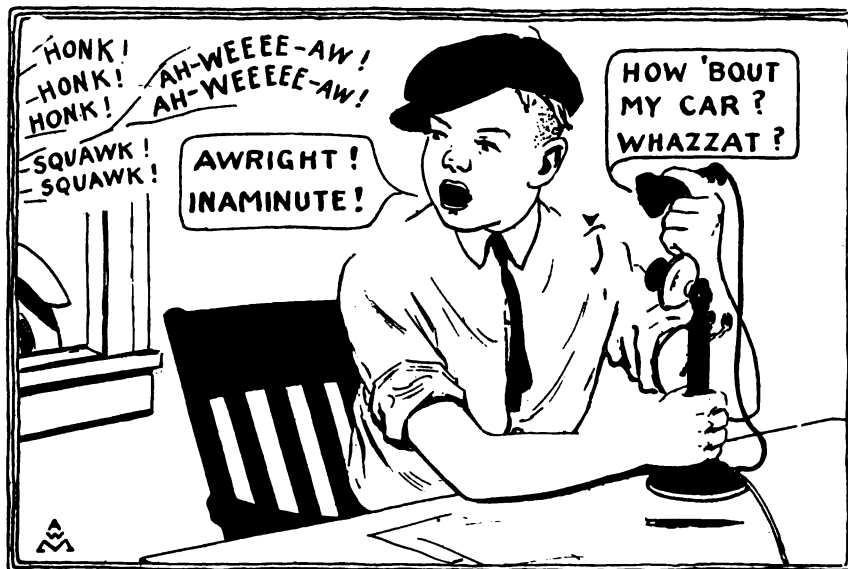
from old J. B., and it sed that he wanted the boss to kno that heed got good serv-ices on fixing that transmisshon and that Bob who aint sposed to work in the shop wassent afraid to put on his old cloze and go to it af-ter hours.

So the boss found out what a good fel-ler Bob is for him and how Chick aint ennything to brag of. Bob woodent of told and I woodent, even if I did want to. Probably theres lots of things the boss never heers

about, things thats pretty much to his advantij and things that pretty much not to it, but I gess a fellers boss aint foold as much about him as he thinks sumtimes.

Ive notist Mister Hecker is alwys showing he knoze sumthing I never wood of thwat he new ennything about a tall. Thats how it cums that when he razes enny fellers pay I notis its always the fellers that awt to hav his pay razed, not sum 4 flusher or sum feller like Chick thats afrade heel work moren he gets paid for.

Theres moren one way of thinking about this thing of working overtime or doing moren youre reely paid to do. A feller mebbly just goes along and every day he does just what the boss tells him to do and he erns his munny good enuf, but he dont get en-



"That Evening I Stayed In the Offis and Told Fokes Their Cars Wassent Dun Yet, and Sold Gas. Gee! I Was Bizzy!"

filld agen so he cood go away with it the next morning, Bob sed shure weed fix it.

Then Bob told Chick to go to it then or to cum back after supper and do it and Chick sed not by a dam site. He sed he had a date with a jane and he was going to keep it and old J. B. cood go to where its a thousand degrees hot in the shade all the yeer round. You know where that is Peet.

I gess if the boss had bin home Chick woodent hav bin so fresh, and if he had of bin, heed of bin sent to that place along with old J. B. But Chick new Bob coodent fire him. So that evening I stayed in the offis and told fokes their cars wassent dun yet and sold gas, and Bob he fixt old J. B.'s. seed Ann.

Then when the car was all fixt Bob

ny better or he dont get enny razes or enny chances for ennything. You kno it Pete.

But if that feller wakes up and gets a moov on and besides doing what heez sposed to do he goes and looks for more to do, and he dont qwit the seck-ond the wissel bloze, mebbly leeving a tire half blode up or haf enuf oil put in a enjin, and he keeps trying to do jobs better, that feller gets a chance sum day. Mebbly he gets a raze he diddent expect.

Mebby fokes he treets rite tell about him and sum other garaje man cums along and says "Ile giv you more munny than youre getting heer." Mebbly theres a chance to start a garaje of his own or buy out one or get to be a partner where he is. I dont half to tell you Pete that the feller that gets the chances and gets help putting em over is the feller who aint bin afraid heed do a littel moren he had to do where he was.

Spouse Bob wanted to start a garaj? Dont you kno old J. B. wood lend him sum of the munny. You tell em Pete! And heed giv him sum bizness too. And Ile say this, too, that when Bob starts a garaje Ime one that wants to work for him. Heel find he can get the best fellers in the bizness to cum and work for him if he wants em.

I dont meen Ime one of the best ones, but I meen I want to get to be one of the best ones and the way is to work for the rite kind of a boss. Aint that the truth? Who wants to lern the bizness working for a garaje where the boss dont care a hoot how you do things or when?

Ile say this; the stricter the boss is about how things is dun around the place, the better workers his help gets to be, whether they like it or not. Theez eezy bosses is all rite for a feller to work for if heez just out to hav a good time, but if he wants ever to get within forty rows of apple trees of the top, nix on the eezy boss! Is your boss a eezy one Pete, or dont you ever try to put ennything over?

Well good by till next time old opie-dildock.

Your frend

Bill.

Motor Car Manufacturers Planning Mutual Insurance.

Forced by the increase of insurance rates during the past few months, the automobile manufacturers and dealers are again turning their attention to the

PENLINGS FROM THE PEN OF DIKE.

The Fourth of July has come and gone. The small boy has shot his fireworks. Now is the time to start your fall advertising fireworks, Mr. Automobile Dealer!

Bumper crops everywhere mean selling automobiles everywhere. Are you ready?

There are two kinds of business men in your city, when it comes to commercial activities. One is a Leaner, the other a Lifter. Which class are you in, Mr. Garageman?

Now that automobile prices have taken a fall, the cry of "High Prices" is lost in the distance. Mr. Dealer! Get busy now. Everything is in your favor. The buyer can't "holler" waiting for them to go down "cause they've done went."

No elections this fall to stir up the country. Why not stir up your community with a rip-roaring advertising campaign? It will pay.

Hot weather is here. So is the tourist. Have ice water in your garage, and the tourist will remember that cool, refreshing drink long after he's put on his "heavies" for the winter.

Spring new ideas in your advertising. Be original. Talk to your customers through the newspapers, same as you would face to face.

Flies and dust compel you to change your windows more often now. But don't weaken. Keep the windows clean and well decorated and the cash register will keep busy ringing.

Push tire pumps now, for the driver sure cusses when he has to pump up a tire at the side of the road these days and has a bum pump.

Every day a new automotive accessory is born. The dealer who succeeds today is the one who only falls for the practical ones that will cause his customer to thank him for calling attention to them.

Make it a rule to greet every customer with a pleasant smile and a feeling that you are glad that they dropped in—even if you have a boil on your neck!

Mr. Dealer, take a vacation this summer. Get out and see how the other fellow does, and you will return with ideas that will more than repay you for your time and expense, besides feeling lots better—and then you will be "rairin to go."

need for an insurance company to care for motor cars and motor trucks, similar to the one launched four years ago.

At the office of the National Automobile Chamber of Commerce in New York, it was stated that the loose methods of accepting risks, over-generous coverage and overhead expense on the part of the insurance companies, has resulted in their requiring rates from which the only relief lies in the furthering of plans for mutual companies and for dealer organizations which are now actively under consideration.

GARAGE ACCOUNTING SYSTEMS.

(Concluded from page 15.)

insurance, advertising, heat, light, power, etc.

These will be posted to the purchase journal under the proper expense heading as general, sales or service. The best way to understand the purchase journal is to post your own purchases to it.

(To be continued.)

Quiz Questions on Garage Accounting.

What is the chief benefit of a sales journal?

Enumerate other sales departments than given.

You get an invoice for accessories from the Mpls. Iron Store. Tell what is done with it when it is delivered to you.

Why is a purchase journal used? When would it be superfluous?

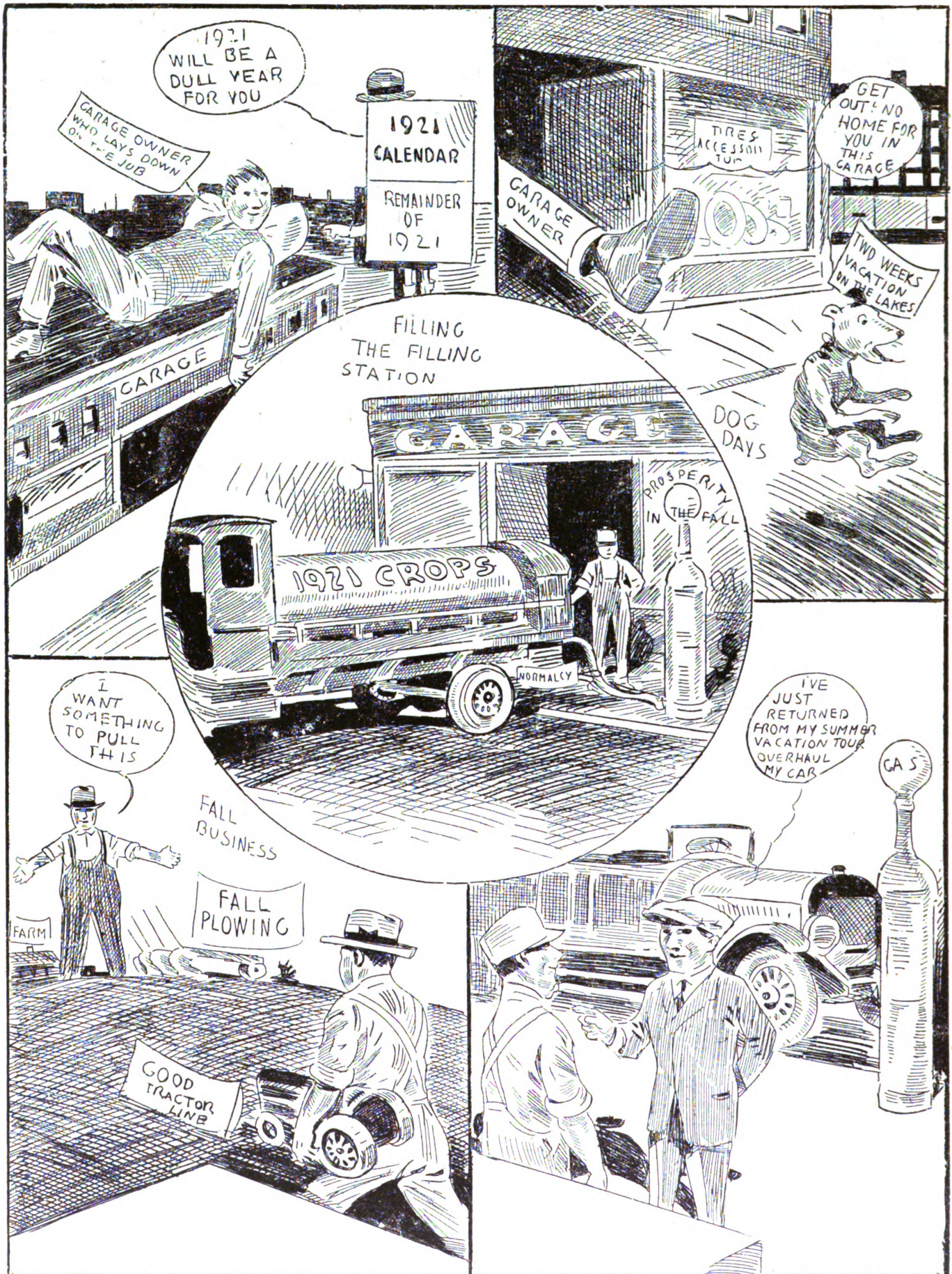
How would you handle cash purchases?

If you purchase from a customer, where is the credit posted? What is the rule to follow in such cases?

How are such expenses as rent, heat, light, power, gas, water, taxes, etc., shown on the purchase journal? How else could they be recorded?

If you did not have a purchase journal, how would you get a proper distribution of your merchandise purchases by departments, of your expenses?

How would you audit your accounts payable ledger?



Compensation and Safety Appliances

Violation of a Provision in the Safety Appliance Act Does Not Relieve Employer of His Liability Under the Compensation Laws—Law Requires That Employer Shall Have Enforced Obedience to Reasonable Safety Rule

By Chesla C. Sherlock

Not long ago, I had occasion to spend an afternoon at a certain garage in the city where I live; for flivvers sometimes contract indigestion and have to have their "innards" exposed to the experienced hand of the mechanic. Going about the plant, from the storage room on the first floor to the shop and washroom and paint rooms on the second and third floors of the place, I saw many things which were of more than casual interest to me.

It was in going from the first to the third floor to get my car—when the welcome news that it was ready was brought to me—that I saw something which has lingered with me to this moment. I happened to be going up on the freight elevator and on this elevator there was posted a large printed sign which read like this:

NOT FOR PASSENGER USE!

The law prohibits the use of this elevator for other than freight traffic. If you disobey the law, our insurance will be void and you can not collect compensation in case you are injured. Obey the law!

Blank & Blank Garage

I noticed, however, in the course of the afternoon, that the employes in that garage habitually used the elevator for strictly passenger purposes. They seemed to pay no attention to the glaringly red poster with its warning. And no one could blame them for not using the elevator, instead of walking up the stairs, for the employer was not providing them with a passenger elevator to serve the same purpose.

The thing appealed to me from the standpoint of the law. What, in fact, is the law on the subject, and was the statement contained in the poster substantially true? What effect would the disregard of the employes for it have upon their rights at law in case they were injured while violating the injunction contained in the warning?

The employer doubtless was telling the truth as he understood it. He had attempted to put two and two together in the natural supposition that, as in mathematics, it would make four—but the law does not work out that way. If it did, justice would doubtless be dispensed much easier and there would be fewer lawyers in the land. Unfortunately, it is just such instances as this that "put the butter on the lawyer's bread," for the employer was all wrong in his conception of what might happen to his liability in case the safety appliance acts were violated.

We have stated again and again in these columns that the safety appliance acts are not abrogated or avoided by the enactment of a workman's compensation law. At the same time, it can be added that the violation of a provision in a safety appliance act does not, in anywise, operate to relieve an employer of his liability under the workman's compensation law—provided it results in injury to the employee—regardless of the manner in which the accident occurred or who was at fault, unless it was due to the "serious and willful" misconduct of the injured workman.

Safety appliance acts are in force in practically every state in the Union. They seek to prevent accidents and to conserve industrial wreckage, of which all hazardous industries are so wasteful. The compensation acts, on the other hand, seek to provide a means of caring for injured workmen after they have been injured. Neither of the two systems in anyway attempts to supersede the other, and if it should the courts will be found to be upholding the compensation laws at the expense of the safety appliance acts.

The safety appliance act, doubtless, did prohibit the use of the freight elevator for passenger purposes, and, if you have a safety appliance act that does not contain such a provision, it is, indeed, a hollow mockery. Here is a fruitful source of accidents—largely due to the fact that the average freight elevator is open and not enclosed as is the average passenger elevator.

It is likewise possible that the em-

ployer's insurance company had a rule or a condition in the policy, which attempted to provide that, if the freight elevators were used by the men for passenger purposes, the policy would be null and void. Putting the two together, as did the employer mentioned, does not accomplish the purpose he thought it would accomplish.

Insurance companies often put a good many conditions and provisos in their policies, which they have no legal justification or basis for making. Neither insurance companies nor employers are permitted by the courts to legislate away the terms of the workmen's compensation acts. If they were, the compensation laws would long since have vanished into thin air and every employer would today have "washed his hands" of the entire matter.

We are not concerned with the question of whether the insurance company could avoid its contract in case there was a violation of the rule. That is beside the question, for the reason that the employer is the person primarily liable for the payment of compensation, and he must pay the compensation without reference to the legality of his insurance contract or his ability to compel the insurer to pay, if such liability attaches.

There is, however, one phase of this question which we have touched upon before, but which must be mentioned in passing. The employer has the right to promulgate a reasonable rule for the safety of his men and he has a further right, even under the compensation system, to compel obedience. But he must compel this obedience. If he allows it to be disregarded habitually, then, in case of injury to a workman, he cannot plead the rule in bar of compensation.

That is too well settled to call for further discussion. Since the employer mentioned doubtless knew that his rule was being violated, it was of no effect whatever in relieving him of his obligation, and a workman using the elevator in the forbidden manner would be entitled to compensation regardless of the hint to the contrary.

Advantages of Burning-in Bearings

That "The Workman Is No Better Than His Tools" Is Indisputable—But Modern Mechanical Genius Has Placed Good Tools Within the Reach of All
A Good Burning-in Machine Means Better Work More Quickly Accomplished

By J. N. Bagley

Seventy-eight dollars for an overhaul job, and having it all done over again in less than a week, makes one feel like having a flock of them instead of one. If Brewster had purchased a couple of dozen of cars, peddled them around to a lot of the fellows who have a garage sign out, and ordered them overhauled, he could have reduced his millions very nicely and saved a lot of worry as to how he would get rid of them.

I am not referring to the garage business as a whole, but to those who are still trying to do things without anything to do with, and without sufficient knowledge of what they are trying to do even though they have the tools. Now, in the writer's particular case, it was as much or more of a case of not knowing how as it was a lack of equipment. If a man is a mechanic he can do fair work with poor tools, while if he has good tools he can turn out quality work in a much shorter time.

The instance referred to cost me \$78 and, inside of a week, the entire job had to be done over. In addition to this, quite a number of new parts were necessary to replace those that were damaged because of the first job being a failure. Being some miles from the garage where the first job was turned out, I could not take it back. I do not think I would have cared to anyhow, but I used a little precaution in looking up a repairman the second time.

I left the old car in the alley, after paying the farmer for hauling me into town, and set out to find a mechanic to do the work who I thought would turn it out in a work-

manlike manner. I dropped into a good-sized garage and sauntered about, not showing any particular interest in any one thing. When the floorman inquired if he could be of service in any way, he nearly jerked me off my feet, for I had so often been asked, "Well, what do you want?" that I had forgotten there was any other method of approach.

Anyhow, I was impressed with his manner, so that I told him I had a car that would, sooner or later, need an overhauling, and I wanted to find out how things were done in the shop before trusting my car to it.

"That's fine," he remarked as he stepped over to a little push button. "We have a mighty fine equipment in the way of tools, as you will find when you go upstairs, and every mechanic at the end of each month draws an extra check for ten dollars if every piece of work that he has turned out during the month has given 100 per cent satisfaction. We write a good many of those checks during the year, I assure you."

"This is Mr. Walker, our shop foreman. He will take care of you."

Mr. Walker, this gentleman is desirous of learning something of our methods of handling repair and overhaul jobs. Will you give him your personal attention?"

Just then a woman drove in with a big red car; that is, I think it was red. Anyhow the woman was good looking and just as polite and courteous as the floorman.

When the elevator stopped, we stepped into the finest, lightest and best equipped workshop I have ever had the pleasure of visiting. Eight men were at work and not a word was said while I was in the shop, which was about 30 minutes as I remember. Walker showed me about the shop giving me a general outline of the way they handled the jobs as they came in. We were down to the last machine on the line—the burning-in machine.

"This machine," Walker began, "is what we consider one of the most valuable machines in the shop. The old method of scraping bearings is never used here. We burn the bearings in and, when a job goes out, we know it goes out right and that we have added a satisfied customer to our list."

It was only a small town and I asked him how he could keep so many men busy in so small a place and so close to two very large towns.

"Goodness," he remarked smiling. "We get a great deal of work from the larger

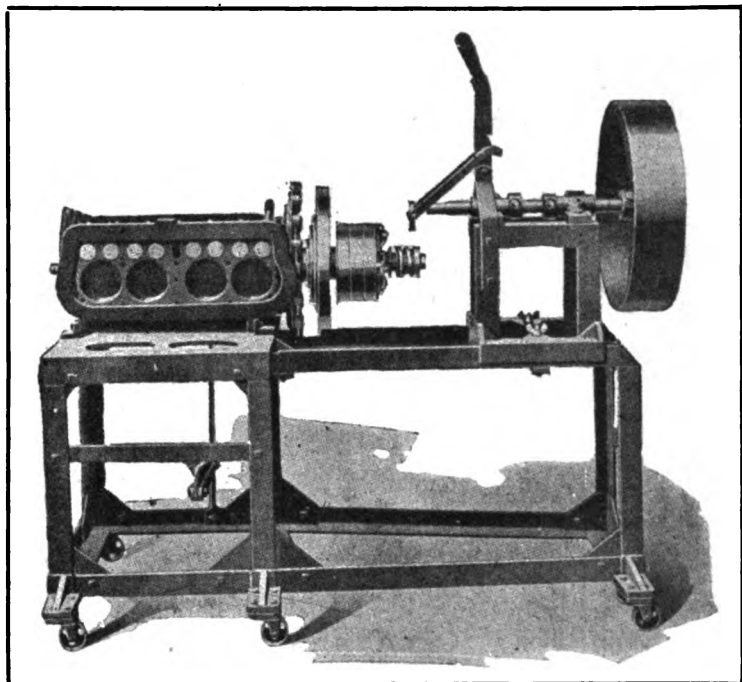


Fig. 1—Simply Constructed and Inexpensive Burning-In Machine Which Is Particularly Good for Ford Work.

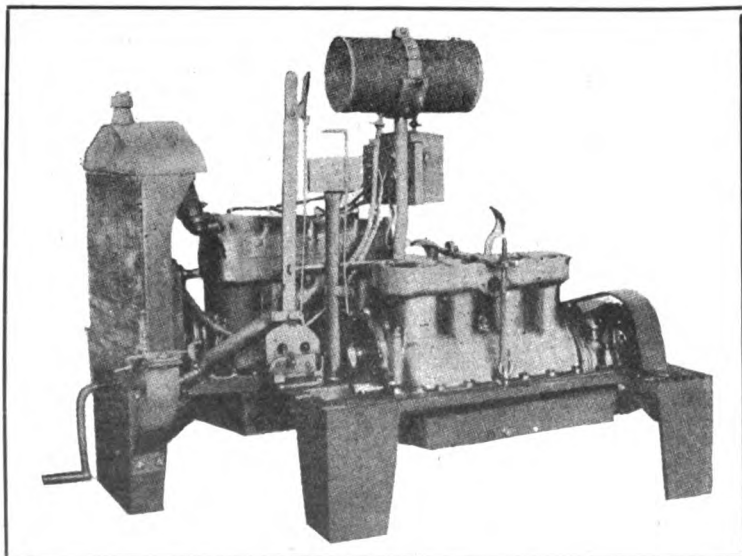


Fig. 2—Another Type of Machine Which Has an Extra Heavy Frame to Eliminate Vibration.

places. In fact, hardly a day goes by but that we get a new customer from one or the other of the larger towns."

"Well, Mr. Walker, I have a car down here about a block that won't run and I'll bring it up, and—"

"No, our service car is for that purpose," Walker broke in. "We make no charge for such services and will be glad to get it."

In a few minutes, the old wagon was in the shop and the "doctor" had diagnosed the case and told me that I could have it at three o'clock the following day. I asked him about how much the job would cost.

"I can't tell you exactly but all of our work goes out 'Suit or no pay' and you will be the judge and the jury."

I left the car and hired a car to go to the little city of Newtown $9\frac{1}{2}$ miles distant. While over there, I made it a point to ask a number of car owners where would be the best place to have a car overhauled. Most of them told me that there were ten or twelve garages in town, and that there was not a great deal of difference, with the exception of one or two, but that if I wanted a first-class job, to take it over to the "One Way Garage," $9\frac{1}{2}$ miles west. I began to feel good about the matter and figured my old car would run again.

At the appointed time, I returned for my car and found it all finished, ready for service. When I started it I couldn't believe it was the same car. It ran as quietly as the day it left the factory. The engine had been cleaned and re-enameled—it was a real job. I paid my bill and received a little sheet of paper which read: "If for any reason this job No. 3878 fails to give absolute satisfaction, within 30 days from date, it will be repaired and made satisfactory free of charge." It was signed by Walker. The car has run many hundreds of miles since it was overhauled and sounds and runs today as well as the day it left either the shop or the factory.

Never before have I seen so successful a burning-in job as this one, and the information I got from Walker regarding burning-in machines and their operation will, no doubt, be of value to others who

are operating garages and who have not had good results with the burning-in machines, for Walker convinced me that there is nothing equal to the burning-in machine for fitting bearings if it is properly handled.

There are, I have found since, a number of burning-in machines on the market, and each of them has features worth considering. All do good work when properly handled. Therefore, the kind of machine to buy is a matter of choice as much as anything else. A very good plan for the garageman will be to write to the different manufacturers and get literature explaining the advantages claimed.

In talking with Walker, the writer learned that 90 per cent of the trouble with burning-in machines comes from the oil that is left on the bearing, for a bearing cannot be properly burned-in when oil is present. The burning-in method saves from five to ten hours' time in fitting bearings the old way. An experienced operator will burn-in bearings in from 20 to 40 minutes, giving a 100 per cent bearing surface against about 45 per cent when using the old method of scraping.

After the bearings have been properly burned-in, the motor can be assembled and placed on the test stand where it can be run-in from the line-shaft until it is sufficiently limbered up so that it can be easily cranked, after which it will operate on its own power. The motor should be allowed to operate on its own power and adjusted properly.

It should also be examined for oil leaks, etc., for they are a great deal more accessible on the stand than in the car. While the motor is on the stand, the carbureters can be adjusted and the final tests made, while, if it is placed in the chassis, it is much harder to get at and many times takes two to five hours longer than it ordinarily should to do the job.

It will be noted from the illustrations that different burning-in machines have different points of advantages. These advantages naturally control the price. The more elaborate equipment costs quite a little more than the

smaller outfits and while, of course, the more elaborate machines are much better and more satisfactory, very good work can be turned out with the less expensive ones.

When the motor is run-in and adjusted on the test stand, one mechanic can look

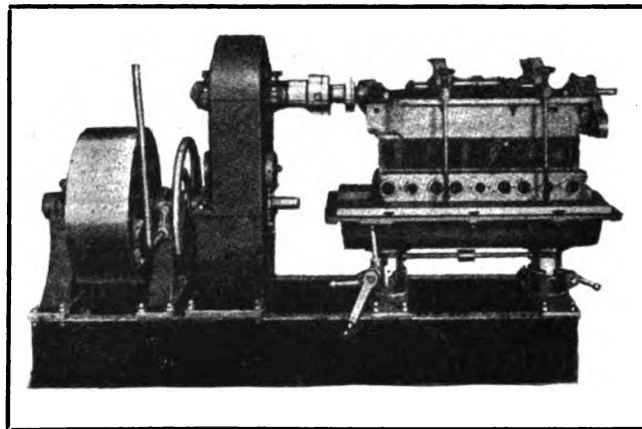


Fig. 3—A More Elaborate Type with Cylinder Block in Position for Burning-in.

after it and make the necessary adjustments. If it is tight and is towed to start it and work it out, two men will be necessary, which must increase the cost of the overhaul to the customer.

In a number of instances which the writer can recall, where burning-in machines have been installed, 25 to 40 per cent more work is turned out with no addition in labor to the shop. Figuring at this rate for a year, the cost of the machine, as compared to what it earns, is very little. The machine is an investment. When it pays dividends it is a good investment and is worth what it can earn to the repairman.

In the smaller shop there may be just work enough to keep one behind all the while, and yet not enough to warrant the hiring of an extra man. In this case, the burning-in-machine is the only solution for, even if used for only a few minutes each day, it will have earned its first cost in a very short time. Even though one should have to borrow the money to purchase, the interest on the investment for a whole year only means one or two jobs and the balance of the year is velvet.

The method of burning-in will apply to any of the machines illustrated and to those not illustrated in the article.

After removing the bearing-caps from both connecting-rod and crankshaft bearings, all the lubrication should be removed from both the shaft and the bearings, for it will be impossible to do a good job if oil is present. After this has been done, the next step will be to set up the bearing-caps one at a time until a man of average strength will just be able to turn the crankshaft with a testing bar, using the strength of one arm only as he stands in a comfortable position.

After the bearing has been set up tight, the nuts should be loosened up about one-half of a turn and the next bearing set up in exactly the same manner, continuing

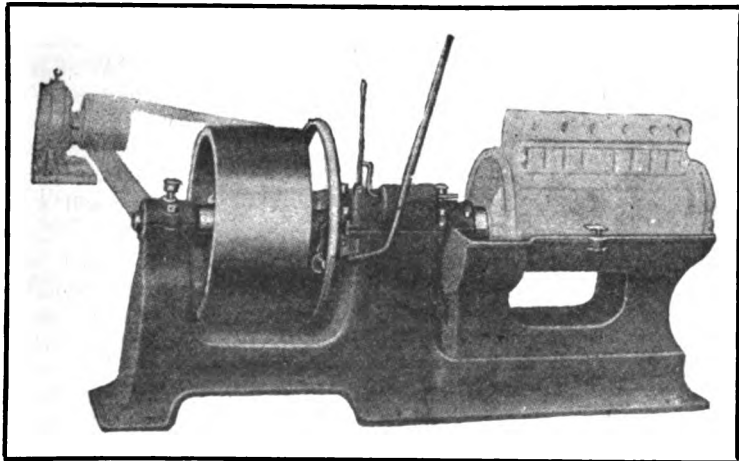


Fig. 4—Especially Heavy to Handle Large Motors.

until all bearings have been set up in this manner. Pistons should remain on the connecting-rod. The motor is now ready for the burning-in, except for going over all the nuts and tightening them the one-half turn which they were loosened while making the test. Care should be exercised, during this assembling operation, that oil does not reach any of the bearings or the job will not be 100 per cent perfect.

Place the engine block, containing shaft, connecting-rod and pistons, on the burning-in stand and secure it with the device intended for this purpose. Some manufacturers use only bolts, while others use some sort of a clamping device. At any rate, it does not matter so that the engine block is held rigid while the work is going on.

We are now ready for starting the machine. Start the power, whatever it be—electric, gas or what not—and shift the clutch lever into running position. It will take from three to ten minutes to do the burning, depending somewhat upon the power for, if the power is not sufficient to drive the tight bearings at full speed, it will take a little longer.

A quantity of oil should be at hand to use the instant the bearings burn into shape. Watch the operation very closely and the instant the shaft begins to smoke a change will be noted in the power; that is, it will seem to pick up and run free.

This is the time the oil should be dashed over the bearings. The oil at once finds its way into the bearings and lubricates, stopping instantly the melting of the metal. The power can be left on and an occasional drop of oil dropped onto each of the bearings until the job is limbered up nicely, when it can be taken out and placed in the chassis.

After a little experience, it will be easy for the operator to tell the instant the burning-in has reached the proper stage, but it is always good policy to make a careful examination of all bearings before placing the keys in the bolts, for many times there might be a slight defect in the bearing due to the oil reaching some part of the bearing during the burning-in process.

In case the crankshaft is of the hollow type, and the bearings are lubricated from the inside, it will be necessary to wash all the oil from the inner walls with gasoline and plug the bearings to prevent anything entering the oil channels that might lodge and so prevent the lubrication reaching the bearings when the machine is assembled.

The same job that can be burned-in in from three to ten minutes takes anywhere from four to six hours to fit up when using the old way of fitting and scraping. When the burning-in job is finished, if correctly done, the bearings will be fitted perfectly. If fitted by hand, no matter how much care may be taken, the work will run from 40 to 60 per cent perfect in nearly every case.

Therefore, it stands to reason that the

burning-in machine, from the angle of good work, is a good investment. When the time of four to six minutes taken for the burning-in process is figured against an equal number of hours for scraping-in, it is needless to say again that it is a good investment for the garageman.

Many garagemen have installed burning-in machines that have not been entirely satisfactory; that is, the work they turned out was not up to the standard that should have been done on the machine. In every case, without a single exception, the fault was with the operator and not with the machine. From a general survey of the garages over the country having burning-in machines, I have found that nearly every one of them lacks sufficient power to do the work as it should be done; that is, they have under-rated the power needed for the work.

It is better to have reserve power than too little, for right in the beginning is when the power is needed. I have one machine in mind that has been installed for over a year, which was set aside because it would not do what was expected. It is back on the job now and every piece of work turned out is 100 per cent perfect. The trouble was that a three h.p. motor was used instead of an eight h.p. motor.

It is not the purpose of this article to show a preference for any particular burning-in machine, for they are all good if properly handled. Many machines have special features that are good and serve a better purpose in some instances than others, and again the price may govern the purchase.

The buying of a burning-in machine must be considered after the uses to which it is to be put have been enumerated. The man in a small garage doing very little overhauling would not be justified in buying as elaborate an outfit as the man having many times the number of engines to overhaul.

A type of machine which is simple in construction and inexpensive is shown in Fig. 1. This machine will do good work and would no doubt answer the purpose of the repairman in the small town or village just as well, or even better, than some of the better ones. This particular machine was designed with more than one purpose in view.

It can be used for burning-in and also serves very nicely for a table for grinding valves, etc., and is particularly adapted to the Ford work. The manufacturer of this machine has a number of little attachments for the different things—such as brackets for holding the rear axle assembly while overhauling, for holding motor in position, for working on the transmission, etc.

Now, by noting the construction of the machine shown in Fig. 2, we find that it is entirely different than the one just mentioned. It was designed with an entirely different purpose in mind than the machine in Fig. 1. The block is mounted on the side of the machine and the power is a Ford

motor, which is a part of the outfit, but, of course, the motor is to be furnished by the garageman.

This is a very good plan, as a motor can be assembled using parts that are seconds. A crankshaft or a piston may be unfit for regular service and yet will answer for something of this kind very nicely. The power is ample to do a nice job and is always ready on a minute's notice.

The frame is made extra heavy so that it will not vibrate in case the machine is placed on skids or on a platform. However, it will work much better on a firm foundation. The high or low speed may be used as desired but, of course, it is better to use speed than to try to run the shaft slowly.

Still another machine is of a more elaborate type; that is, it has special features adapting it to a wider range of uses than some of the other types on the market. The fact that different types of engine may be fitted by adjusting the bracket makes it a popular type of burning-in machine; especially in the larger shops where a good many different makes of cars are handled or repaired.

The block is placed in the upside-down position for burning-in so that the bearing bolts can be reached handily. For running-in the bearings after burning, the block is turned over and the job finished. In Fig. 3, this machine is shown with a cylinder block in position for burning-in. It will be noticed that the table or bracket on which the block rests is adjustable to the different blocks.

Fig. 4 shows still another of the popular types of burning-in machines, which has met with favor the country over. This machine is made especially heavy in order to handle large, heavy motors.

There is another similar type of machine in which the engine is placed in position for running-in on its own power after the burning-in operation has been completed. The plan of running-in on the engine's own power is not a bad idea, as it gives the operator a chance to adjust the carburetor and locate all oil leaks, provided there are any, and repair them before setting the engine in place.

This machine has advantages in its favor, just as do all the other types. As already stated, the choice of the machine must be figured out by the man who is to use it after he has gone over the situation from all angles, taking into consideration the number and kinds of motors he will want to handle on it.

One thing should be remembered: All machines are good machines when properly handled, and will pay for themselves many times over in the course of a year when car users find that a motor runs like new after it has been overhauled and the bearings burned-in. Manufacturers will gladly send catalogs on request, describing fully their outfit and its advantages.

Legal Rulings of Interest to Garagemen

Cars Kept for Private Use of Owner and Family Not Subject to County License Tax—Length of Time for Repair Work—Conjecture Not Sufficient Basis Upon Which to Base a Verdict—When Seller Can Recover from Sheriff

By R. R. Rossing

Excessive Damages for Injury to Automobile.

A verdict of \$399.50 for injuries to an automobile was held excessive. The amount claimed for repairs was \$127.50, and \$272 were allowed for loss of use of car pending repair. The car stood 27 days without work being done on it at the repair shop.

The court held that the repairs should have been made within three days at least, and it was an error not to set the verdict aside or reduce it to \$157.50.—*Rosenstein vs. Bernhard & Turner Automobile Co.*, Supreme Court of Iowa. 180 Northwestern 282.

County License for Commercial Motor Cars.

Automobiles and motor cars used by the owner for his private use and that of his family, are not subject to license tax by a county, but are subject only to the license required by the state; but all automobiles and motor cars used for commercial purposes are subject to a license tax by a county.—*Johnson vs. State*. Court of Appeals of Alabama. 85 Southern 567.

Reasonable Time to Make Repairs on Car.

Where the owner of an automobile delivers it to the proprietor of a garage, for the purpose of having repairs made upon it, and no agreement is made as to the time in which the repairs are to be completed, the question as to what is a reasonable time is one for determination by a jury.—*Sisson vs. Roberts*, Court of Appeals of Georgia, 104 Southeastern 910.

Garage Keeper Liable for Freezing of Car.

A garage keeper, to whom an automobile was delivered for storage under a simple contract of bailment, is liable for damages resulting from the freezing of water in the car, especially where he expressly agreed to maintain sufficient heat in the garage to prevent freezing.—*Bussy vs. Hatch*, Supreme Court of New Jersey, 111 Atlantic 546.

Street Car Liable When Exceeding Lawful Speed.

An automobile driver, about to go on a street railway track, at a street intersection, has a right to assume that an approaching street car is moving at a lawful speed and that the motorman is on the lookout and will bring his car under control.

An automobile driver, seeing a street car coming a considerable distance away, is not bound to stop and wait for it to pass.

After having stopped to allow another car to pass, plaintiff's automobile, moving at two miles per hour, was struck by the street car running 30 miles an hour. The

WORK AND PROSPER.

"Everybody should have work—good work, that will make them prosperous. A man who only works with his brain is lazy. Every man should do some work with his hands.

"Mechanical things should relieve flesh and blood in every possible way. Drudgery is useless work that has to be done over and over. It is not at the expense of the body but of the spirit."—Henry Ford.

jury gave judgment against the street car company, holding that the plaintiff was not guilty of contributory negligence in failing to look and in proceeding across the double tracks.—*Geo. C. Stuart vs. Washington Ry. & Elect. Co.*, Court of Appeals of District of Columbia, 267 Federal 632.

Not Negligence to Stop Automobile on Track.

A man driving his wife and guests in his automobile, stopped on the street car track in order to assist his guests, one of whom was blind and the other a sufferer from paralysis, to reach their home. A car came on them suddenly and struck the automobile before it could be started.

It was ruled that neither he nor his wife were negligent, and therefore not precluded from recovering from the street railway for injuries.—*Fitch vs. Bay State St. Ry. Co.* Supreme Judicial Court of Massachusetts. 129 Northeastern 423.

Unreasonable Delay in Accepting Landlord's Offer.

Delay by a garage tenant for over 50 days, and until three days before the lease would expire, in accepting the landlord's offer to continue the tenancy on a month-to-month basis, was clearly unreasonable as matter of law and terminated the landlord's offer without formal withdrawal.—*Burton vs. Ladd*. Supreme Court of Michigan. 178 Northwestern 774.

Seller Can Recover Automobile From Sheriff.

An automobile sold by a contract of conditional sale, was registered in the name of the vendee and was attached as his property. The sheriff had possession of the automobile and presumably of the certificate of registration when the vendor assigned his rights under the contract.

The court ruled that there was a good transfer of his interest, although the provisions of the motor vehicle act as to registration and transfer of the registration were not complied with.—*King vs. Cline, Sheriff*. District Court of Appeal, California. 194 Pacific 290.

Not Liable for Injury of One Borrowing Truck.

In an action against the owner of a motor truck, the body of which overturned and killed plaintiff's intestate, one of the men riding on the truck at the invitation of the borrower, who was driving a number, including the intestate, the evidence was held insufficient to carry to the jury the question of whether the defendant knew of the defect in the body of the truck which caused it to overturn.

A gratuitous bailor, who lends a motor truck, is bound only to warn of defects of which he knows, and need not even warn of defects open and patent to the bailee. Hence the lender is not liable for failure to warn as to the defects of which he does not know, though he might well know of them, as the law merely forbids one person to lay a trap for another.—*Johnson vs. H. M. Bullard Co.* Supreme Court of Errors of Connecticut. 111 Atlantic 70.

Speed Not the Cause of Accident.

A pedestrian injured by a motor truck cannot recover damages by reason of the speed or the lack of signals, where there is nothing to indicate that the speed or the lack of signals had anything to do with the accident.

In an action for injuries to a pedestrian by a motor truck, where the plaintiff was unable to testify, and it was just as probable that he was riding on the rear end of the automobile truck and was thrown therefrom when it turned a corner as that he was struck while attempting to cross the street, there was nothing upon which to base a verdict for plaintiff except conjecture, and that is not sufficient.—*Flanigan vs. McLean*. Supreme Court of Pennsylvania. 110 Atlantic 370.

Welding, Cutting and Brazing Practice

Parts Which Would Otherwise Be Junked May Be Satisfactorily Mended by the Welding Process—Some "Don'ts" for the Welder—Specific Examples of Fender Welding—Choice and Manipulation of Filler Metal Important

By David Baxter

There is scarcely any metal part of an automobile, truck, or tractor which the oxy-acetylene welder can not repair. There is nearly always some way to mend the twisted, cracked, broken, or worn castings and forgings if the welder is at all ingenious and possesses some degree of skill in manipulating the torch.

In fact, there is a great deal of this class of repairing which can be done only by welding; the welder being the only one who can repair many of the damaged parts.

On the other hand, many automobile parts which can be repaired by other methods are often more readily mended by the torch welding process. Then, too, the torch is often of great assistance in connection with other methods and tools.

Take, for instance, the fenders of all motor cars. Here is one part that before the advent of the autogenous welding process was consigned to the junk pile when badly damaged. Now, fenders may be resurrected from the junk heap and put into a very presentable state by a skillful application of the welding process.

In connection with a fender-rolling tool, the torch can make a badly damaged fender look like a new one. The fender roller is not an absolute necessity but it facilitates the work considerably.

Where the fender is but slightly damaged, the welding torch is very convenient because it is not necessary to remove the fender from the car.

Numerous repairs can be made without dismantling the fender. Split seams or

However, it is better, when not too much trouble, to remove the fender and take it to the welding shop. The work is considerably easier and a better job is obtained where the fender is dismantled, because



Fig. 1—Welding a Broken Fender Bracket.

the fender can then be placed in any position to weld.

It may be shifted constantly to meet the changing condition of the weld. Also, all of the welds can be made on the inside of the fender where they will not show so plainly. Welds made on fenders attached to the car must usually show quite prominently.

Considerable enamel paint is usually burned off around a weld. This is worse on the side where the welding flame is applied, which is another reason for welding on the in or under side wherever feasible. On metals as thin as the average fender, it is next to impossible to keep from melting entirely through the sheet unless the torch operator is exceptionally skillful and proficient.

This condition is aggravated where the weld is made without dismantling the fender, on account of the awkward location of the weld. Often the weld has to be made upside down or overhead, which complicates the matter and results in more enamel being burned; that is, a greater area is burned around the weld.

Very nearly if not all automobile fenders are made of one grade of mild steel, or sheet iron, as it is variously called. Therefore, when the operator learns the peculiarities of one fender weld he should be able to handle any of them, insofar as fusing and joining of the metals is concerned. That is, after he learns the actions and reactions of the molten metal in one fender,

he is reasonably certain to find the same thing in other fenders.

The mechanical actions of the metal in different jobs will probably vary with each job, according to the location and extent of the weld. In other words, the warpage or distortion may not be the same in two jobs, depending upon the location and extent of the weld. These things can soon be controlled, as the fundamental theory is the same.

Perhaps the first thing the welder will learn in fender welding is that he must approach the weld slowly with the torch flame, and that this flame must not be too large. Also, that its condition should be strictly neutral. It must be kept continually in slight motion; at least ready to move on a moment's notice—advancing, retarding, revolving, or swinging, as the melting requires.

In consideration of the first item, the flame must not be bored fiercely and directly down upon the fender, as it will melt almost before the welder realizes it is hot. Then he will blow a large hole entirely through the fender before he has a chance to defend himself by drawing the flame back. The fender metal is too thin to stand up to such rough tactics. The enamel paint tends to conceal the melting so the welder is caught unawares.

The better way is to approach the metal rather slowly, holding the tip of the flame back an inch, and watching the heating metal. Advance the flame a little at a



Fig. 3—Welding a Split Seam.



Fig. 2—A Very Simple Fender Weld.

torn sheets can be welded as well as brace rods and brackets without taking the fender off the car. And this is true also in welding the fender flange, where the old one has rusted off.

time as the fender turns red. The flame should be as close as it ever is when the metal turns bright red.

As for the second item, the flame is smaller, if anything, than for welding the

same thickness in castings. This is because the steel in the fender, or any steel for that matter, oxidizes upon the slightest provocation. A large flame is one of the main things that furnishes the provocation.

A flame that is too large will oxidize or burn the fender metal very easily, because it is hard to control and too large an area is melted. Even though the operator is particularly expert, the heated area on each side of the weld will blister and distort sometimes despite his skill.

The closer the welding can be confined to the weld, the better it will be; that is, a narrow weld will not tend to warp so much. That is practically out of the question if a large flame is used. Then, too, it does not take long, with a large flame, to burn or blow a hole through a fender almost before the welder can conceive it.

After the operator has selected the proper tip to produce the correct flame for fender welding, he must learn to be careful about adjusting it. A strictly neutral flame is the one for fender welding on account of the metal, and especially on account of the thinness of the metal.

Fender metal oxidizes easily and, if it is thin, by the time it oxidizes much it is all gone. When fenders do oxidize, they are burned—almost beyond redemption. A slight excess of oxygen in the flame turns the metal to oxide in a few seconds—a condition which is detected by the sparks that fly from the weld.

There are a number of sparks flying all the time, but when they increase to a shower, the welder may know that his flame is wrong, if he is handling it right. The chances are that his flame is no longer neutral but has gained in oxygen without his perceiving it. A good plan is to test the flame from time to time during a protracted weld, particularly when in doubt.

In regards to keeping the flame in motion all the time: This does not mean that the welder should keep the flame moving regardless of the condition of the weld. Rather, that he should not move it until the weld requires the movement, which is practically all the time on fender welding, since the weld is continually changing.

The operator should endeavor to have the torch manipulation become instinctive, so to speak. Then the flame will automatically advance when the metal is not fusing fast enough, will be drawn back when the metal is in danger of burning, or will concentrate upon the filler or weld as needed. It may work ahead of the filler to prepare a larger portion for filling. These things become a sort of habit unconsciously acquired by the right kind of practice.

Another important item in fender welding is the choice of filler metal and its correct manipulation. A small filler rod or, properly speaking, a small filler wire is the best for fender welding—small compared with filler for other jobs. The metal thickness through which the weld is made gov-

erns the size of filler, of course, but ordinarily a smaller rod is best.

Take, for instance, thin metal such as car bodies, or hoods, or the thin parts of fenders. A bicycle spoke is an excellent filler wire. For the heavier parts, a wire about the size of an eight-penny nail is good. While a quarter-inch rod is all right for brackets, braces, etc.

Probably the best instruction that can be given for the manipulation of the filler rod is that which applies to torch manipulation. The filler is handled according to the fusing condition of the weld. If too much filler is flowing, the rod is held back a little. If

TO DEVELOP POWER— THINK!

There is no doubt that if any of us can be induced to approach a task with the belief that we are capable of thinking about it and that if we keep on thinking about it we shall probably develop something that will make us do our work better, we shall, in all probability, actually do the work better. After all, doing a job a little better than the other fellow is all there is to success.—Irving T. Bush, president, The Bush Terminal Co.

a larger supply is needed, it is kept in contact with the flame.

Ordinarily it is kept in constant contact with the weld, and a twisting movement employed. If a ripple effect is desired, this twisting is accompanied by a sort of sawing motion is to prevent it from oxidizing, for ridge and then the rod is drawn back slightly. This movement is repeated again and again as the ripples are formed.

The main object for keeping the filler in motion is to prevent it from oxidizing, for the filler metal will burn as easily as the fender. Another reason is that fusing metals are run together or mixed better. The twisting rod helps to dislodge the bits of slag and float them, thereby permitting the metal to mix. In conjunction with this, the rod is used to scrape any oxidized metal to one side and to flit bits of slag out of the weld.

Flux is not employed when welding fenders if Norway iron or steel is used for filling metal. So, the operator does not need to bother with flux. If he is repairing the damage with brass filler, he should use a good grade of brass flux powder, applied by dipping the heated end of the rod in the powder at frequent intervals.

Let us take some specific examples of fender welding and see what devices were employed to overcome the obstacles in each instance. Fig. 1 shows the repairing of a broken brace. This brace was made of wrought iron, or mild steel, as it is variously called. The fracture was located in the corner or angle on the in or under side of the fender.

The metal was approximately half an inch

thick by an inch wide, making a heavy weld as far as fenders go. The crack should have been grooved out, but this could not be done without removing the brace from the fender, which was objectionable. So, the weld was made by melting to the bottom of the crack.

The heat of a weld of this size is bound to char a large area of the fender paint. Therefore, the welder cast about for some device to eliminate the heat effects as much as possible. The feat was quite simple and was achieved by filling the hollow part of the fender around the brace with water.

Water was poured in until it filled the hollow about half-way up on the thickness of the flat part of the brace. The pressure or force of the welding flame prevented the water from interfering with the fusing, and yet kept the fender cool enough to prevent it from charring.

This water device may be employed in various ways on many fender jobs. Wet rags can be placed along the weld or water may be poured on, or the fender may be immersed to within a short distance of the weld.

In welding this brace, the flame was played back and forth along the crack until the adjacent metal turned red-hot. Then the flame was concentrated on one spot at the end of the crack. Here it was revolved until the metal became fluid, at which time the Norway iron filler was brought close to the flame.

Then, as the flame bored deep into the brace metal, the melting filler was twisted into the molten bath. Between the two, the crack was melted and stirred together. The flame advanced and retreated quickly as this occurred. At the same time, it was slowly advancing to another portion of the crack where the deep melting and puddling process was repeated.

The whole length of the crack was treated the same, the welding being done as rapidly as possible to keep the heat from being conducted away. This weld cooled almost as fast as it was made, so that the fender was ready for service as soon as the welding was finished. There was no necessity for slow-cooling this job, nor was there any need to slow-cool any fender work.

In Fig. 2, another form of fender welding is indicated. Here it is practically impossible to prevent charring the paint. The best that could be done was to employ a small flame and small filler and thus confine the heat as much as possible. The operator kept the weld as narrow as he could to minimize the burning.

A short weld like this is not difficult to make because it is over almost as soon as it is started. Being in a location where it can be filled quite easily, it is really immaterial whether the weld is made on the inside or the outside of the fender. Norway iron is good filler material for this weld and is applied with a neutral flame.

A somewhat more complicated weld is indicated in Fig. 3. This was the welding
(Concluded on page 34.)

How Dealer May Increase Business

Average Motorist Has Misconception of Meaning of Headlight Laws—Accessory Dealer by Preparing Himself to Assist His Customers With Their Driving Light Problems May Pave His Way to Some Profitable Business

By Robert Livingstone

When you say "headlight law" to the average motorist, he immediately has visions of driving behind a light that is sadly inadequate for comfort and safety. Possibly his attitude is more or less justified in view of the general lack of information on the subject. Possibly he has had experience with devices that were designed only to comply with a part of the law, the part requiring the stopping of glare, and which, while efficient in that respect, have ignored the demand for better instead of worse light.

At any rate "headlight law" carries the impression that it is necessary for him to buy something which he doesn't know much about, and use it for the protection of other motorists who may or may not reciprocate by giving him the same protection he gives them.

The accessory dealer who familiarizes himself with the laws in his state, and is prepared to give his customers an answer to their problems, will find an opportunity for increased business, both in the sale of devices that will enable the motorist to comply with the law and in the headlight service which will be demanded as soon as the motorists realize that headlights, like brakes or carbureters, need a reasonable amount of skilled attention if they are to perform at anything like their best efficiency.

Today there are more than 20 states which have headlight laws, and most of these laws are being enforced under a standard set of specifications which were originated by the Society of Illuminating Engineers, and which have been approved by a great many other organizations, such as the National Traffic Officers' Association, National Automobile Chamber of Commerce, the A. A. A., the S. A. E., the National Safety Council, etc., and consequently represent the very latest practice.

With one single exception, namely, the state of Nebraska, the headlight laws based on these standard specifications say nothing at all about lenses, but merely specify the minimum amount of road light and the maximum amount of glare that will be permitted. The idea is not to make people use lenses but to make them pay attention to their lights and arrange or equip them in such a way as to get a safe driving light for themselves, and stop the glare that bothers other people.

It is possible to comply with these laws without using any lenses, provided that legality is all that the motorist desires. For instance, the headlights can be bent away down or, with bulbs properly focused, the

top half of the plain glass may be painted—although, of course, any such makeshifts are very detrimental to the driving light.

It is true that the minimum light required by law can be secured in this way, but it must be remembered at the same time that the minimum required by law is not what is supposed to be a good light, but merely the worst light that will be tolerated.

With laws of this sort, which specify a certain kind of light, it is evident that compliance can not be secured by merely put-

OPTIMISM.

Optimism is the motive power of a successful life. Without it labor lacks incentive and endeavor has no goal. Optimism is a form of faith, a faith in the possibilities of the future, a faith in the ability to overcome and to achieve. Optimism destroys suspicion and doubt which have done more to prevent success and happiness than all the other mental evils to which man has fallen heir. No height is too steep, no reward too great, to be won by youthful energy if it be impelled by the magic touch of optimism. Look forward, Look upward, and press onward with hope and confidence that all will be well.—Robert Lansing.

ting a pair of lenses in the headlights—because no lens, unless properly adjusted, will give the kind of light the law requires, let alone a satisfactory driving light.

For instance, if the headlight happens to be pointed up in the air, or the bulb is not properly focused for the particular make of lens that is used, there will be just as much glare or possibly more glare than there was before the lenses were installed.

Apparently, the car manufacturers and a great many of the lens manufacturers do not consider that the performance of a pair of headlights can possibly make any difference to the people who use them, for no car manufacturer that we know of, and very few of the makers of lenses, furnish any instructions whatever for the proper adjustment of headlights.

Consequently, there is a large field of profitable service for garages and service stations—for who would not pay a reasonable charge to have his headlights adjusted to give a better light? We know of motorists purchasing cars with headlights incorrectly adjusted—so bad, in fact, that one could hardly see a hundred feet—who have driven for thousands of miles without real-

izing that any improvement could be made until some garageman, who recognized the possibility of making money or perhaps simply took pity on them, surprised them by making a few adjustments that doubled the pleasure of their night driving.

It is a fact that a great many car owners avoid driving at night simply because they are afraid to take a chance on the roads with the poor lights they have. In their own minds they think their fear is of the glaring headlights they meet; but really it is the weakness of their own headlights that makes the other fellows' headlights seem to glare.

Every time a garageman takes this fear of night driving from a motorist and makes an enthusiastic night driver of him, it means the use of more tires, accessories and gasoline and more profits.

The average headlight is built so poorly, and its mechanism is usually so thoroughly concealed from the user of the car, that work of this sort is something that must be done by a service station rather than by the car owner. Actually the work is no more difficult than adjusting the brakes, but it does require some special knowledge of how a headlight works and what must be done to accomplish correct results.

This is especially true when light distributing lenses are used, and it is of utmost importance to remember that each make of lens requires a different focusing of the bulb to make it operate properly. In states where there are headlight laws and motorists are buying lenses to save themselves from the activities of the police, the dealer should either impress upon his customers the importance of proper adjustment or make the adjustment himself. Anything short of this is nothing more or less than "gold-bricking" the motorist, and no dealer wants to get the reputation of doing that sort of thing.

The Editor of THE AMERICAN GARAGE & AUTO DEALER realizes that it may be difficult for readers to secure detailed information on the subject of headlights, for nothing of consequence has ever been published and, therefore, he invites any dealer who wants information to write and ask for it.

This service will be furnished gratis to any dealer, whether or not a subscriber to this magazine, and its absolute reliability is assured by our having added to our staff an illuminating engineer who has, for several years, devoted his time to a special study of road illumination and the laws which are in effect in various localities regarding it.

Glimpses in the Garageman's World

A Shave in a Garage is Unusual But it Can be Had to Perfection in This Philadelphia Garage—It's Not the Chronic Kicker But the Fellow Who Says Nothing to You Yet Tells All His Friends Who Does the Damage

Anybody coming to Williamson's Garage, Fifty-seventh St., below Willows Ave., Philadelphia, Pa., who may discover that he needs a shave, a haircut, a shampoo, or anything else dispensed in a hirsute fringe-

go after it; it won't come to you. This man can sell his oil if he is in earnest.

This is the way to do it. Send the book-keeper, stenographer, or some high school girl or boy to the courthouse to make a cor-

that profit? Put this same advertisement in the paper the day that you send the circulars. If advertising is done right it will surely pay.

Never say too much. Remember people don't have much time to read. In this case it won't take long before the customers will come rolling in. If the persons receiving the circulars buy the oil and are satisfied, they will tell their friends about it in the neighboring towns. When people begin to talk, your business is all right.

Ways of Getting the Business.

The noisy complainant, or the crank, is the one who makes the men of the shop, and the boss, too, sneak out at the back door. But there is still another kicker. He is more to be feared than the noisy fellow who begins to spout the minute he shuts off his engine. This man is the "silent kicker."

The noisy fellow, at least, gives one a chance to make the service right. He does point out the way to an error that needs correcting or is a danger to the shop's reputation.

The silent kicker does not. He tries a place once and, not getting satisfaction, mentally gives the place a black mark and decides to give it a wide berth thereafter. He tells his friends, too, and all the while the proprietor is none the wiser regarding the fault of his service.

To avoid a misunderstanding, one garageman, who charges enough to warrant employing the right sort of men and turning



"Shave or Haircut?" Get One at This Garage While You Are Waiting for Your Car.

removing studio, may unobtrusively slip into the neat little barbershop in that one-story building and go the limit.

He will find the razors just as sharp, the towels just as hot, the barbers just as attentive and the face-whisk just as tickly, as in the more pretentious tonsorial establishments downtown. Lilac, bay rum and other scents are used, too,—not gasolene!

And down where Divinity St. pokes its nose into Springfield Ave., also in the City of Fraternal Affection, there is a group of garages of the individual type, coming to a head in a tire store and an oil and gasoline dispensary, all conducted by G. C. Diets, manager, where a line of cigars, several brands of cigarettes, and candies and gum have special, well advertised departments. 68 car owners congregate here regularly, to say nothing of casual oil and "gas" trade; so the cigars, cigarettes and gum are turned over rapidly as stock.

Why Not Sell Oil?

An automobile cannot run without oil, and if you are a dealer in oil or any other accessories that are so necessary to a car, now is the time to put them before the public.

Let's sell oil today!

Here is a man who can get a certain kind of oil cheaper than his competitors, and yet, he is afraid to risk it for fear he won't sell enough to pay him. Fear and doubt have ever been the worst handicaps to man. If you want business you have to

rect copy of the names of all the owners of automobiles in the county. In many counties these cars are registered in the sheriff's office and he will be glad to grant you this privilege.

While your assistant is making this list, you should have your town paper printing attractive circulars. Mail these out to every-



This Tire Store Found a Stock of Cigars, Cigarettes and Candy Profitable.

one on your list, and if you don't reap a rich harvest, I can't see why.

If a man can save one or two cents, or more, on a gallon of oil he is going to do it. So why shouldn't you be the one to make

out the right sort of work, has a plan that he uses. The man who does remain away dissatisfied does so deliberately so far as this shop is concerned.

A couple of days after the automobile

owner has taken his car out of this shop, he finds in his mail a card reading:

You know we guarantee our work, of course. You are entitled to satisfaction here, if it is within our power and reason to give it to you. Sometimes, after a car has gotten on the road for awhile, there may show up some little trouble which neither you nor we foresaw.

If it is our fault, we are glad to make it right. We want you to bring the car back. If it is some other trouble, you, of course, will want it fixed at once. This is to remind you that we expect you to give us the opportunity to make things right. We appreciate your patronage that much.

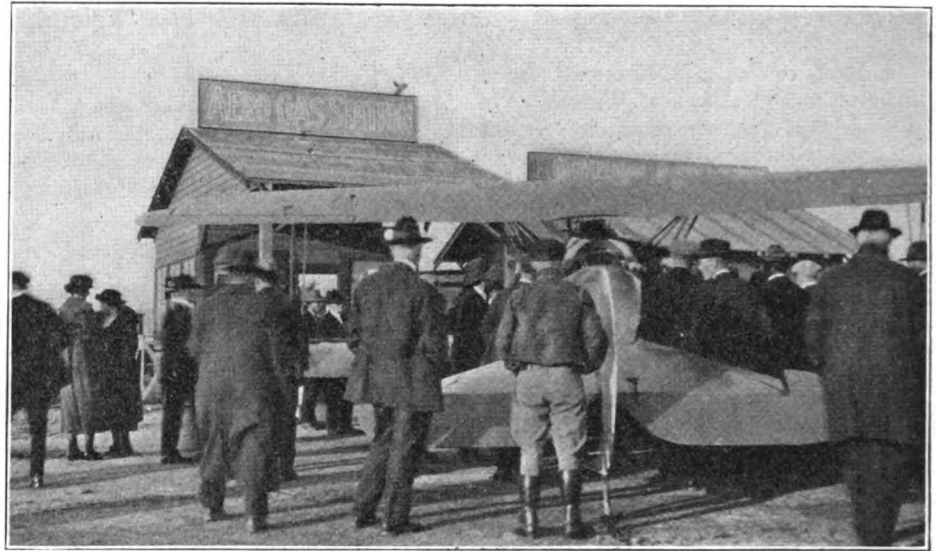
The testimony of such a card is to quiet the kicker, to bring him in rather than to scatter a bad reputation for the shop. The man who sees that the shop is trying its best to be fair is not nearly so likely to raise a howl over a matter as the fellow who thinks that the garage is trying to get the best of him. Sometimes it is the fault of the shop. It has given him the wrong impression.

The illustration shows the "stop-your-cussin'" car of Fred C. Smith, Saticoy, Calif. In it he visits the many ranches around his city, as mentioned in a recent issue of this magazine. Finished in light gray and kept clean, it is not only handy,

tion in itself. He finds that, by going to the rancher, that man is more inclined to bring out enough work to make the trip worth while than he would otherwise.

Advertising matter is secured at a min-

on a bargain table some article which has been cut in price to make it a special. It is something that the automobile owner needs and it does not replace any regular item. By cutting the price to make it in-



Oil and Gasolene Stations for Airplanes are the Latest.

used to print various forms of advertising sent out and distributed by the shop. A great deal of the shop's business comes as the result of handbills sent about town.

Figuring that a man will read anything that is placed on the seat of his car, one garage prints cards of its accessories lists and drops one onto the seat of each car that is along the streets on busy days. That these are scanned very carefully, is the observation of the dealers using the cards.

In order to get people into the habit of buying their accessories at its counter, a

gees. It lost lots of business to the more congested districts. Then the business men of the locality got it into their heads to do some co-operative advertising. Garages and battery stations joined with them. They issued an 8-page newspaper of advertising. Each firm put forth inducements and talk about convenience in dealing in the community.

Of each issue, 10,000 copies were circulated in that section. One automobile electric shop took a half page in the paper. After the plan had been working for some time, it was observed that people from that district as well as people from others began to drop in to inquire about jobs.

Latest in Oil Stations.

With the coming of regular airplane routes along the Pacific coast, it is necessary to have stations for supplying their special grades of oils and gasolene.

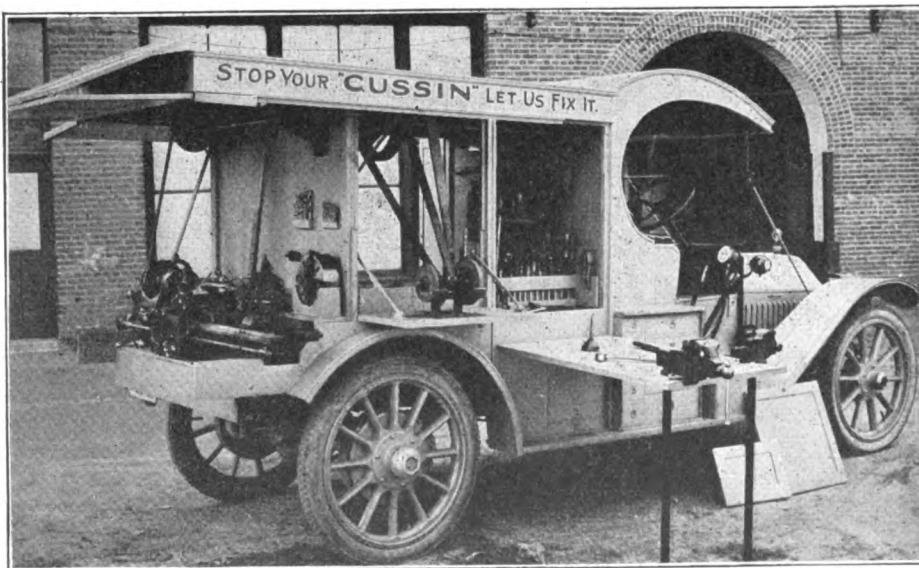
One located near the Mexican border in southern California, is shown in the illustration. The arrival of a plane is as much of an event as was the arrival of an automobile 20 years ago.

Display Windows and the Price "Tag."

The "bone of contention" in many discussions on business stimulation is whether merchandise placed in display windows shall be marked with prices. So far, no conclusive decision has been reached.

Some argue that marking display goods discourages the wealthier patronage by detracting from the "tone" of the shop. Others contend that marking merchandise plainly with prices attracts business and that many customers assume that all merchandise carried by the shop displaying unmarked goods is prohibitive in price.

This appears to be a question which must be decided by the individual dealer.



Who'd Want to "Cuss" When This Efficient Service Car Comes Right to His Ranch?

practical and efficient, but a recommendation cost in the Candee Fix-It-Yourself Garage in Los Angeles. This shop has a job printing press which is operated by the regular shop power. Between times, it is

shop in Great Falls, Mont., each week has teresting, the car owners are induced to come in.

There is a little shopping community far out on one of the main streets of Los An-

Facts and Ideas for the Tire Dealer

"Using the Wires to Sell the Tires."

Have you made your telephone a salesman? Hundreds of dealers are doing that today and goods are going off their shelves because they have been calling prospects on the telephone. The use of the telephone for making tire sales has proved successful.

At the suggestion of the B. F. Goodrich Rubber Co., a test of telephone selling was made by James Gilroy, manager of the Massey-Pfundstein Corp. of South Bend, Ind.

Mr. Gilroy lined up a list of prospects and called them on the telephone. When he had finished, he was elated over the results. During the test he talked personally to 29 car owners—not only "talked" but he sold tires to eight of them.

An interesting fact in this test was that all of the prospects called were either strangers or now-and-then customers. In his telephone conversation, Mr. Gilroy offered free tire inspection and advice on tire saving to all motorists, regardless of the make of tire used.

Among those called was a doctor, who said that he was not in need of tires, but that he would call around and have those on his car looked over for injuries. He drove in the following day, had his tires inspected, and left a tube to be repaired.

A record was kept of each of the first 29 calls and they were followed up with a sales letter or the prospects were later interviewed personally. Where a prospect indicated that he might buy soon, a personal call was made the following day in an endeavor to close the deal.

Here are the results of a few of the calls:

Would "come to store—thanks for calling."

Would have tires inspected.

Wanted 38x7's a little later.

Bought two 30x3½ regular safeties.

Sent tubes to be repaired.

"Thanks—will come to store and look at cords."

"Will send truck to store for tire inspection."

"Have pneumatic to be repaired."

Bought four 37's.

Another dealer is said to be so enthusiastic that he considers his telephone worth \$5,000 a year as a salesman!

For regular customers to whom the dealer can suggest the need of precaution against future tire trouble, the telephone is a real aid. Picture to these customers the discomforts of changing a tire in the hot sun. Point out the necessity of a spare.

To customers who come in just once

in a while, you can offer an inducement that will bring them to your establishment regularly.

New prospects will appreciate the interest you are showing in their automobiles. It won't hurt their feelings to suggest that you can insure them against future tire trouble, and thereby add to their safety and comfort while they are driving. You will be marked as a progressive and pave the way for future relations.

It is often advisable to offer the prospect some special service. An offer of free tire inspection is usually most favorably received by the average automobilist.



A Mighty Sales Aid—Use It

When approaching a prospect it is better to have a special sales talk ready than to attempt to use a general sales argument and it is well too, to have some foreknowledge of the prospect's tires and their condition. Many dealers inspect tires on the street. This can be done more easily, of course, in the smaller towns where the owners can be more readily located. If you know something about your prospect's tires before calling them on the telephone, you can, of course, have a more definite and intelligent message for him as to his particular needs.

Business men and professional men have a special aversion to tire trouble as they are usually in a great hurry—and time means money. A garageman in Buffalo gives a special service to these men. Some of them drive their cars to his place every week and have their tires inspected free of charge and have minor injuries corrected.

Hardly one out of ten questions the advice of this dealer, in whom they have come to have absolute confidence.

Let's suppose that you had examined the tires of a parked car and on checking the license number found the car was the property of Dr. Jones, a physician. After figuring on the time of the day when Dr. Jones would be least busy, you might get his telephone number, suggests the B. F. Goodrich Rubber Co., and approach him something as follows:

"Dr. Jones, this is Mr. Adams, of the Market Garage, Main and 5th Streets. I know you will pardon me for calling you at this time when I say that one of your tires has hardly more than 300 miles of service left. As a matter of fact, it may blow out at any moment—perhaps just when you are hurrying to a sick call.

"I realize that you are a very busy man and have to have, not only quick service, but absolute insurance against tire trouble. If you will take a few moments to drop into my place tomorrow morning, I am sure I can relieve you of tire worry altogether. I am giving physicians a special tire service because I realize just how busy they are."

Perhaps the doctor is not carrying a spare. If he isn't, then the dealer stands a fair chance of selling him one. A sales talk on the dealers' part while the doctor is in the office might induce him to buy. Or the minor injuries on his tires might be looked after. After giving this service, the dealer is sure to establish himself in the prospect's confidence, and unquestionably make him a future customer.

It would be difficult, perhaps to close a sale or establish a service arrangement over the telephone—but the telephone will serve to introduce you to your prospect. You can also arouse interest in employees in the use of the telephone as a sales medium and perhaps offer them some special inducement in the way of a little prize for the one who makes the most telephone sales.

And keep a check on your old customers. If some of them have not been coming around for some time, call them up and ask them to call around and see you. "Human nature is the same everywhere." People like to know that you are interested in them and in their patronage. That in itself will often bring them around.

There are many other ideas which will naturally come to your mind once you begin to give this plan serious thought. The summer season will bring increased sales of tires. Don't miss your share.

Practical Hints for Shop Mechanics

Tool for Fitting Cones.

When removing the cones on a Ford front spindle, some will be found to fit very tightly. If driven on with a hammer there is danger of chipping them.

We find that a piece of 1¼-inch pipe, eight inches long, makes a dandy tool to drive them into place with. It will fit against the square shoulder and will not damage the ball race.—R. W. T., Mo.

* * *

For Loose Felt Washer Retainer.

To fasten a loose felt washer retainer in front wheel of a Ford car, remove the wheel and lay it down. Put the retainer in position. Scrape the retainer and hub where they join, for an inch on each side. Apply soldering fluid and very hot copper with solder.

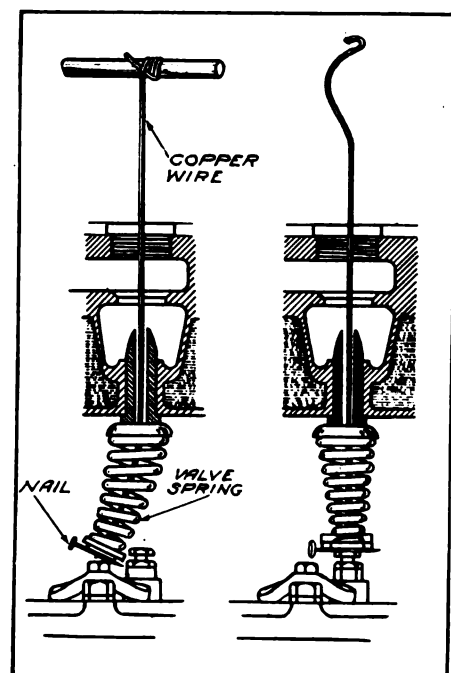
This is a never failing remedy. To remove, either chip or melt out the solder.—A. C. O., Neb.

* * *

For Replacing Valve Spring.

Recently, while overhauling a Hudson Super Six, I had the front valve of the motor, as well as the valve spring, to remove in order to release the valve which was sticking and failed to seat properly.

After dressing the stem of the valve and reseating it, I was ready to replace the spring and valve but, upon attempting to



Makes Valve Replacement Easier.

replace the spring, I found it more of an undertaking than I had anticipated as the tension of these springs is something great and very hard to compress; also, the space at this end of the motor is limited and

ONE DOLLAR EACH

Each shop, hint and illustration printed in this department means one dollar or a renewal of subscription to the person sending it in. You have some time or labor saving ideas which you know are thoroughly practical; tell us about them in your own language. Write out a brief description, with a sketch if necessary, that is all we require. We will fix up the sketch for reproduction; a finished drawing is not needed, simply a free-hand sketch. You get a dollar if the idea is worth publishing.

is more than ordinarily hard to work in.

After some consideration, I finally contrived to replace the valve spring in the following manner, which is simple enough after you have found the idea, and it took less than one minute to accomplish this.

Take a piece of soft copper wire—copper wire is specified on account of its being easy to bend, which is very essential—of conventional size; insert through the valve stem and guide through the valve spring, which must be placed in position, and through the valve spring retainer.

The wire should be doubled with the loop end down; place a short piece of heavy wire, or a six or eight penny nail will do, through the loop in the wire under the valve spring retainer. The whole assembly may be pulled into place by the ends of the wire which extend above the motor block. The nail is then removed from the loop in the wire and the valve replaced in the guide.

This method is superior to compressing the spring and fastening with wire, as the wire is often very hard to remove when pressure is on the spring.—E. L. H., Va.

* * *

Increase Your Tire Mileage.

We hear of many ways to increase tire mileage while the tires are on the car, but here is a way to add mileage after the tire is too far gone for a tire.

I know one enterprising man who took an old tire and used it to halfsole the shoes of his family of five. The halfsoles wear like iron and, of course, are waterproof. The soles are put on with big-headed tacks to prevent the rubber pulling over the heads.

To make the job more effective, apply a thin coating of cement on the sole before tacking on the halfsole.—V. I. T., Idaho.

Brake-Lining Cutter.

For cutting brake-lining, I find that an old tobacco cutter, used to cut plug tobacco, is an ideal tool. A paper cutter or an old file may also be used for this purpose.—G. C. C., Ore.

* * *

For Stubborn Cylinder Heads.

Removable cylinder heads are often hard to break loose, especially if they have been shellacked on. If all the bolts or nuts are loosened about 1/16th inch and the engine started, the head will be loosened quickly and with minimum damage to the gasket.

In no case should the bolts be loosened more than 1/16th inch and care should be used to have them all loosened the same amount.

When replacing the head, graphite grease should be used on the gasket instead of shellac. If graphite grease is not at hand, use hard oil or cylinder oil.—S. E. G., Iowa.

* * *

Battery Worker's Kit.

Formerly, the electrician in a battery station had to carry a kit with him on the jobs about the plant and run back frequently for tools and material or apparatus.

Now he easily takes his entire outfit with him to each car on which he has work. He has built a little cabinet with shelves and drawers and fitted it with rubber-tired casters.

The handle is cleverly made from two



Portable Cabinet has Space for all Tools.

large shelf brackets, connected at the outer ends by a piece of iron strap, filling the bill satisfactorily. At the lower end of the same side, two more brackets inverted hold his battery.—C. A. G., Cal.

When Clutch Slips.

If trouble with a slipping clutch is experience, a cake of common soap may be used as a remedy.

Simply shave off thin slices of soap and put on the face of the clutch. This makes an excellent temporary repair when miles from home. This method applies to both disk and cone clutches.—K. C., Maine.

* * *

Spring Assists Tire Repairman.

One's arms will soon tire when a number of treads are to be ground off of heavy casings before retreading them. Place a hook in the ceiling, over the rotary rasp, and fasten a long coil spring to it.

To the other end of the spring, a rope is tied terminating in an iron hook. This hook is fastened to the tire to be rasped, and the spring carries the weight of the casing. This relieves the operator's arms. The hook should be large so that the tire may be freely shifted.—R. W. T., Mo.

* * *

Washing Out the Ford Crankcase.

Drain out the old oil, put in the drain plug, and pour one-half gallon of kerosene into the breather and start the motor, letting it run about 15 to 20 seconds. Remove the drain plug, allowing the dirty kerosene and oil to drain out.

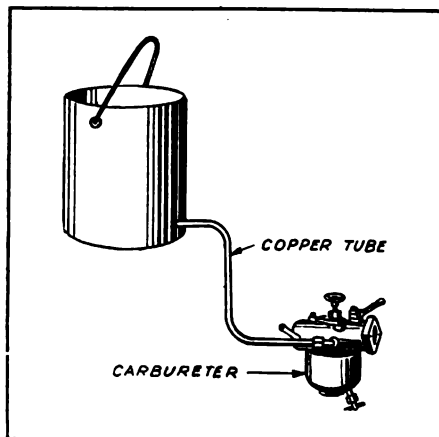
Now put one quart of clean oil into the breather to force the kerosene out of the troughs in lower corners. Put the drain plug in when clear oil flows from the drain, and put in three quarts more of good oil.

See that the drain plug is tight and that the copper gasket is still there between the plug and the case. Now you are ready to drive.—A. A. W., Wash.

* * *

Testing for Float Valve Leak.

So often, after a carburetor repair, I have wondered whether the float valve would leak or not. After having to take



Simple Test For Leaking Float Valve.

one off for the third time to adjust the float valve, I designed the test tank described.

Get a gallon bucket and punch a hole near the bottom, solder about two or three feet of copper tubing in this hole, and hang the bucket up over the carburetor bench. After

the repair, put the proper connection on the length of tubing and fasten it to the carburetor.

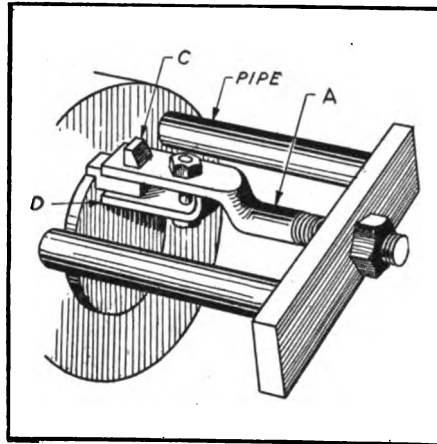
By filling the bucket with gasoline, you get the proper pressure on the float and float valve and a few minutes will tell whether the valve holds or not.—D. & F., Mo.

* * *

Key Puller Which Is Easily Made.

This home-made tool is about the best that I have ever used for headed keys, and is one that is simple and easy to make for anyone needing such a device.

The main part is made by flattening one



Home-Made Tool For Headed Keys.

end of an ordinary bolt of suitable size and bending a little offset as shown at A; then drilling it for a slot to fit over the keyhead, as at C. A strap-plate D is used to clamp the tool to the key.—C. H. W., N. H.

* * *

Quickly Made Emery Grinder.

Most any shop that does overhauling has the necessary parts to make a handy power emery grinder. It can be assembled in spare time.

Select a discarded Ford axle shaft, and fit a collar three inches from the end that formerly held the gears. Then place in the lathe and thread the end for a nut. Place the emery wheel against the collar, and then put on a washer and tighten the nut.

A small belt-pulley, which will give the grinder high speed, may be made from a discarded Ford rear hub with the flange. Fit this on the shaft with a key and nut. Run the belt on the portion where the hub cap formerly was. This may be mounted in a frame with hardwood bearings or else fitted with babbitted bearings. The cost is but little. This home-made grinder will help in keeping chisels and punches sharp.—W. R. T., Mo.

* * *

Hard Oil and Gasket Cement.

Many mechanics, when putting on cylinder heads, use a copper gasket and also some shellac or some specially made gasket. Then, when the head is taken off again the gasket is spoiled.

Use common hard oil. Smear a little of the hard oil on both sides of the copper gasket, and you don't have to hurry so much because of the gasket drying. Whenever a cork or paper gasket is used, hard oil smeared on both sides may be used instead of cement and the gasket may be used more than once.

Whenever the head is taken off, you will also have no trouble in getting it off. The cement often holds the head so tightly that you have to spend many minutes in getting it off. Hard oil on gaskets holds the compression or oil very satisfactorily.—E. S., Ia.

* * *

Breaking Up Sediment in a Can.

To quickly loosen sediment in the bottom of cans where one uses any of the various polishes or cleaning compounds that require shaking to mix the ingredients into solution, place a couple of screws or nuts into the can. When the can is shaken these objects will quickly loosen the sediment in the bottom.—H. C. W., N. H.

* * *

Oil Grooves.

In cutting oil grooves in a bearing the cut should be made V-shaped and not U-shaped, as is so often mistakenly done.

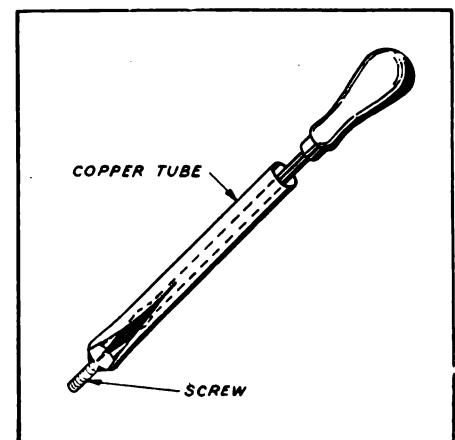
The U-shaped cut, because of its sharp angle with the shaft, has a tendency to scrape or wipe oil from the shaft, while the angle of the V-shaped cut avoids this and permits proper distribution of the oil.—A. Z., N. D.

* * *

Screws in Inaccessible Places.

For placing small screws in inaccessible places, we use about six inches of small brass tubing. It is split about two inches with a hack-saw and the two halves slightly opened up to the width of the screwhead.

Then bend small hooks on the two split ends as shown in the illustration. The



For the "Out-of-Reach" Screws.

screw will hang in the split ends of the pipe and a small, long cabinet screwdriver will slip down the pipe and engage the slot in the screw. Any size pipe can be used or a number of sizes made up for different size screwdrivers.—D. & F., Mo.

Readers' Questions and Answers

Pounding.

Please tell me, through your magazine, what causes pounding in the engine of a car. I have a car, the engine of which has been giving me trouble in this way, and I can't seem to find out what is the matter.—F. H. R., Wash.

If a pound in the engine is regular and continuous, it is likely to be from lost motion in the bearings. If it is irregular and occasional, it is more likely to be due to pre-ignition caused by incandescent carbon or from imperfect connections.

If the pounding is accompanied by occasional missing, especially if the missing is more frequent when the car is running than when the engine is idling, it is more apt to be due to imperfect electrical connections.

* * *

Motor Overheats.

We have an Overland engine which overheats. Can you help us in locating the cause?—E. V. W., Idaho.

It is probable that the engine which you have mentioned is cooled by means of a natural cooling system, such as the thermosiphon.

Your trouble may be due to the presence of scale or rust in the water jacket, as this would hinder the flow of the cooling water and would prevent the liquid from coming into direct contact with the heated metal.

Generally, some fault in the carburetion or lubrication is found to be the cause of the overheating. However, you may find that some foreign material, such as pieces of rubber from defective hose walls hanging down into the hose, is obstructing the flow of the liquid.

* * *

Car Will Not Stay in High Gear.

We have a Studebaker, 1917 model, five passenger car, that will not stay in high gear passing over rough roads. This car has had a new transmission case. Previous to this, the high-speed gear meshed O. K.

The second speed gear seems to mesh perfectly now, and the shifting rod locks perfectly in both second and high speeds. How can this difficulty be overcome?

Both second speed sliding gear and second speed countershaft gear, also high-speed jaws, are in good condition and are new gears.—A. Y. R., Mont.

Your trouble can be eliminated by removing the front of the transmission case from the car. Remove the universal joint from the driving shaft extending through the transmission case. The shaft may then be removed.

Place a steel washer just back of the inner roller bearing—the washer should fit the shaft and be just thick enough to set the high-speed jaw on the driving shaft

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

back far enough to mesh properly with the high-speed jaw on sliding high-speed jaw on the second speed gear, when it is locked in high-speed position.

Replace the shaft into the case, install the universal joint, adjust the bearing in the case properly, after which the transmission may be assembled. You should have no further trouble bringing the high speed in mesh.

* * *

Testing Platinum Contacts.

We bought some ignition contacts lately, in which we have since found that nickel silver had been used instead of platinum. Can you tell us some good way to test ignition contacts to find whether or not such substitution has been made?—E. C., Minn.

The following method may be used to detect the substitution of nickel silver for platinum in ignition contacts:

You will need, for this test, a chemical test tube and a small amount of strong nitric acid. Then take a few filings from the contact, place them in the test tube with the acid, and apply a gentle heat. Where nickel silver has been used, the filings will dissolve and color the acid green. If they are plain silver, they will dissolve more slowly.

The acid has no effect at all upon genuine platinum, as it can only be dissolved by boiling in a mixture of nitric and hydrochloric acid, the chemical term for which is aqua regia.

* * *

Reducing Tire Air Pressure.

Is there any objection to the reduction of air pressure in tires on a hot day? What is the effect of heat on the casings?—L. B. C., Wyoming.

It has been conclusively shown that the constant friction and flexing inside a tire does generate a considerable amount of heat and that underinflation increases the amount of heat. For this reason it is not advisable to reduce the air pressure in tires on a hot day.

An increase in temperature of 23 degrees and an increase in pressure of five pounds only was shown in a test made on a five-inch cord tire run at 30 miles an hour for two hours at the standard 70-pounds air pressure when the temperature of the air was 62.6 degrees F.

In order to increase the pressure 15 pounds there would, of course, have to be a temperature increase of 70 degrees over normal. It will be seen, therefore, that increased temperature need not occasion any particular concern.

* * *

Oil Pumping.

I have a H. A. L. 12, model '21, which pumps oil pretty hard in the cylinders, on the right side worse than the other—but all V-shape motors pump oil on the right side worse.

Can you advise me in regard to the best leak-proof ring I can get—the one that will hold the oil down? The rings I have now do not seem to hold the oil down as they should.

I want a ring that will hold the oil down and that will not be too expensive, if I can get one.

Please advise me what ring to use to get best results and where to get it, if possible.—M. S. G., Fla.

Motor car makers equip their cars with the piston rings which they consider best suited to the particular type of car, and that is the case with the car you mention.

If installed in a cylinder which is not badly worn out of round, it would seem to us that the piston ring you mention should give good results.

The company recommends the use of the leak-proof ring in the lower grooves of the piston in severe cases of oil pumping, and the other ring in the top groove of the piston. In an ordinary case of oil pumping the leak-proof ring will usually give good results installed in all the grooves on each piston.

If your cylinders are worn badly out of round or scored, we suggest that the best solution of your trouble would be the regrinding of the cylinders and the installing of new pistons and rings. It does not seem, however, that this could be possible, as we note that the car is a 1921 model.

There are a number of other good piston rings in the market, and you may obtain information as to the type of ring best suited to your needs by writing to any one of the piston ring manufacturers whose names you will find on our advertising pages.

Motor Trouble.

Please publish the following, as it was a puzzle to me and may help someone else.

Last week a Commonwealth car came into my place and the man said he had spent \$20 in trying to get the motor so he could start it in less than 20 minutes, and said the trouble was in the distributor.

I tested it and put it back and told the customer to push on the starter. The motor would not catch. I had one of my helpers crank it and the same thing happened. The customer said it would start in about 20 minutes. Then I adjusted the carbureter and tried again, with the same result.

I tested all the plugs out of the motor and all fired well. I said to the customer, "You got me." He said, "It will go in 20 minutes." I answered, "It will go in less than that." So I went and got a new plug and put it in the fourth cylinder and told my customer to push on the starter.

The motor started at once. I took the plug out and put the old one back and motor would not go. I put the new plug back, pushed the starter and it went the first time. I tried this four times. At last the man said, "Give me four of those plugs."

Now, I have never guessed why it would start so easily with only one plug, for the old one fired well and tested O. K., and the motor hit perfectly on all four. I know this fourth plug was firing perfectly and all the cylinders had good compression and the distributor was good. Now please let someone guess the cause.—T. C. M., N. C.

From the description of the trouble with the motor mentioned, we assume that the coil and contacts in the breaker box, and also the distributor, were functioning properly and were correctly adjusted. Further, that the timing and the carbureter were cor-

rect and the valves properly adjusted, and no leaks into the combustion chamber of the motor or manifold.

We suggest that perhaps the plugs in the motor had been used for some time, after which the points became burned away, causing too wide a gap for the spark to jump for easy starting, whereas, after the motor was once started, compression would be brought against the weak spark at a greater pressure and would be fired more readily.

The new plug, installed with points of proper distance, perhaps ignited the charge in number four cylinder, causing the motor to turn over several revolutions quite rapidly and giving the results which have been explained.

* * *

Motor Overheats.

We have a model A.C., 5½ ton Mack truck, the motor of which is giving considerable trouble by overheating.

The carbon has been removed, and the valves ground, and ignition, carbureter and timing are perfect. The motor runs O. K. until it heats up, and the water will boil in a short time.

The fan and water pump are in good shape and working properly. Can you suggest a reason for this motor overheating? This truck is five years old.—M. T. W., Conn.

On this model Mack truck, of that year, several if not all of them were equipped with a radiator fitted with a small water tube. In numerous cases, it has been found that these tubes were stopped up in the top, where the water passes on the return from the water jacket from the motor.

This stoppage can be removed by dismantling the radiator and applying compressed air at the bottom of the tubes, using a soft wire for starting this stoppage if necessary.

On the later model truck of this type, a larger tube is used in the radiator, and this gives no trouble of the nature you describe.

We suggest that one of the new style radiators be installed on this truck.

* * *

Windings Connected—No Circuit.

In the wiring diagrams of the ignition systems, I notice that one end of the primary winding of the induction coil is grounded on the frame of the car and also, one end of the secondary winding. I do not understand why the ends of the two windings can be connected together. I should think there would be a short circuit between the windings. Please explain how this is.—B. M. T., Ohio.

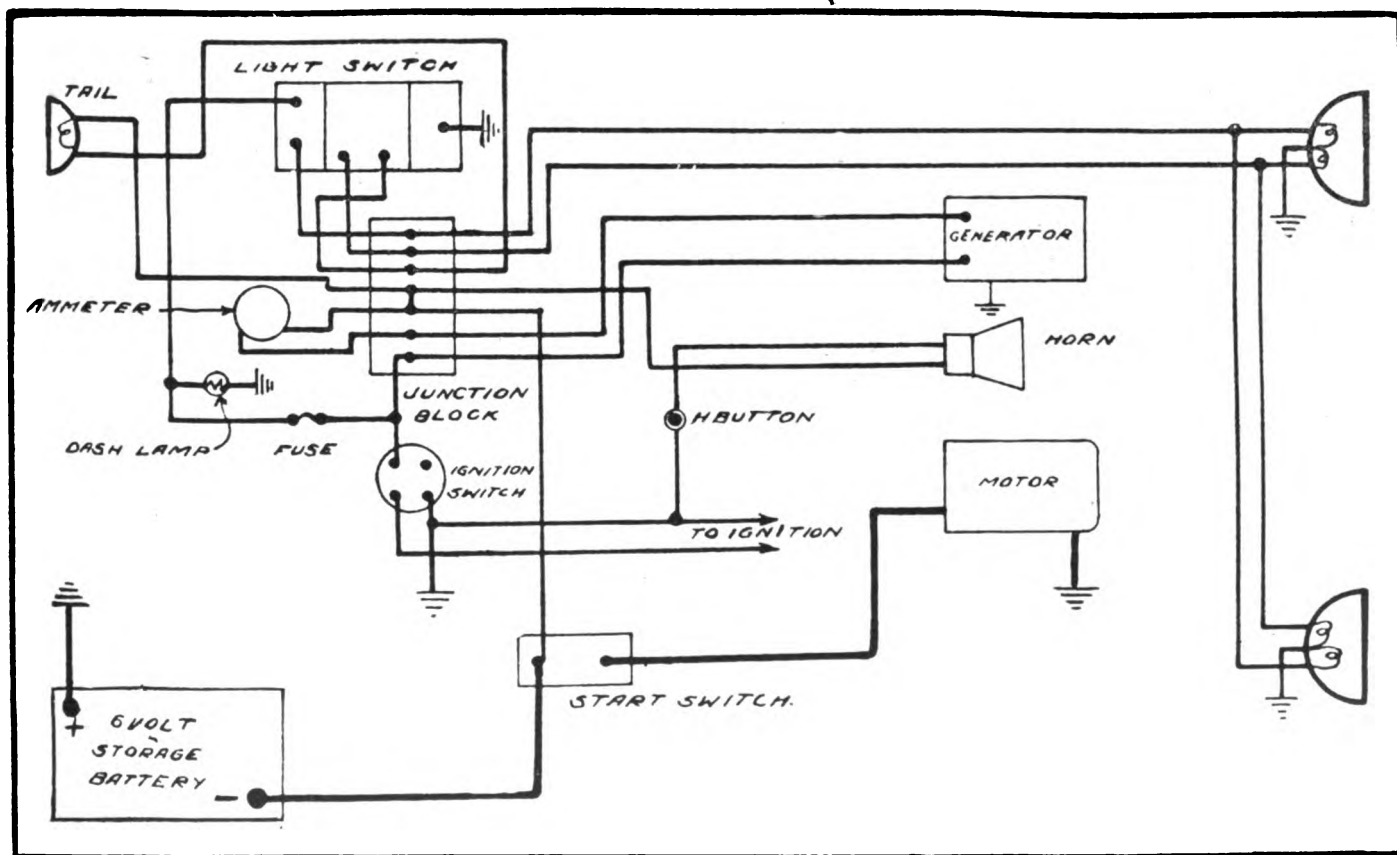
The windings are grounded on the frame to save wire. If the two circuits are carefully traced, it will be found that none of the battery current in the primary circuit can flow through the secondary winding as the coils are only connected on one side. And, therefore, there is no complete circuit.

* * *

Wiring Diagram for 1916 Mitchell.

I would appreciate your publishing a wiring diagram for the model 1916 Mitchell.—A. B. W., Fla.

We are giving the wiring diagram for which you ask on this page.



Wiring Diagram for 1916 Mitchell.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 25.)

of a split seam. The worst trouble in this was to prevent the sheets from distorting. When two parallel sheets are welded together, the contraction of the cooling weld tends to pull them together.

This will cause one to overlap the other as the welding progresses, provided the sheets are free to move with the contraction. But, if the sheets are held rigid as was the case here, then the distortion takes place in a different form. It causes the line of welding to rise in ridges or to sag in sharp hollows. In other words, the distortion acts up and down instead of side-wise.

To eliminate this reaction as much as possible, the welder tacked the whole length of the seam in spots about three inches apart before welding it solid. This is what is termed spot-welding, and is accomplished by welding a tiny bit of each edge together with a drop of filler metal.

After spot-welding the entire length of the seam, the operator applied the flame to the second spot and welded back to the first. Then he started at the third spot and welded back to the second. Thus, the entire seam was welded backward, a section at a time. This reversed the action of the contraction and prevented the tendency to overlap or to warp up and down, as is the case where the whole seam is welded straight. In this, the contraction follows the welding and finally becomes strong enough to pull the sheets together directly in the molten part.

When welding backward, in short sections, the contraction follows the welding, but the distance is so short that, by the time it reaches the other welded section, its power is spent because the other section is almost fully contracted by this time.

he worked deftly and rapidly to prevent the heat from spreading out over the fender. This minimized the chance of warping. This weld was made on the inside of the fender.

Some fender welding is done with spelter or brass wire as a filler. In this process the fender metal is not melted; at least not more than a very thin skin of the surface. Usually the fender metal is heated only bright red, and the brazing metal piled up along the seam, for this is in reality only a brazed joint, used mainly where the fender is worn thin, or when the welder is working close to the automobile bodies.



"Everybody Works"—on New Lee Highway.

Another Great National Highway Now Under Construction.

The splendid automobile highways now being developed from coast to coast must indubitably prove contributory factors toward the strengthening of the bonds making our land one closely-knit, indissoluble Union.

It is with this thought in mind that a group of patriotic Americans of the South have organized for the purpose of constructing, through the Southern States, a highway which is to be the counterpart of the great Lincoln Highway of the North—the two constituting a grand circular thoroughfare.

It is altogether fitting that this new highway, conceived in the land of Robert E. Lee, should serve also as a memorial to that great Southerner, and so it is to be known as the Lee Highway. The Lee Highway will begin at New York, as does the Lincoln Highway, the two coming together at San Francisco—one pursuing its course through the Southern States, the other taking a route through the Northern States.

Road-building agencies, government-

al and otherwise, have expressed their approval of the project.

The first meeting of the Lee Highway Association was held at Knoxville, Tenn., Jan.

19, 1921, on which occasion messages from the president of the United States and the then president-elect were read, expressing

interest in and approval of the purpose of the organization.

Work on the new highway is progressing in a most satisfactory manner. Down in Luray, Va., enthusiastic citizens dropped other occupations for a day and devoted their brawn and energy to the furthering of the project in a practical way—by personally going out and working on the highway, as will be seen from the illustrations on this page.

Safety Council Calls Attention to Exaggerated Statement.

Statistics secured by the National Safety Council from its 41 local safety councils and the 8,000 industrial plants, trade organizations, and governmental agencies included in its membership indicate that the 80,000 deaths caused by accidents last year should be apportioned as follows:

Automobile accidents	11,000
Industrial accidents	22,000
Home and public accidents other than automobile accidents	47,000

While the National Safety Council states that a condition under which half as many persons are killed in automobile accidents annually as in all industrial accidents warrants the serious attention of the entire country and particularly the attention of every branch of the automotive industry, it also claims that an injustice is being done in the circulation of exaggerated statements.

There was a misstatement of a recent interview with S. J. Williams, secretary and chief engineer of the National Safety Council, when Mr. Williams said: "Approximately three times as many persons are killed by public and home accidents as in all factories, mines, railroad, and other industries combined."

Of course, those who made the erroneous statements overlooked the fact that automobile accidents constitute only a portion of the total number of public accidents.



A Tough Bit of Road-making, This.

But even when employing the spot-weld system, the operator kept the weld confined to a narrow strip and added barely enough filler to join the sides of the seam. Also,

Accessories—Dealers' Key to Profits

Vizor Is Latest of the Many Desirable Vulcan Products.

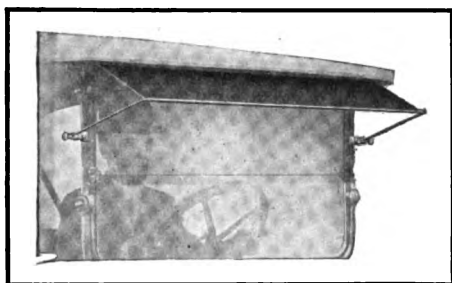
The Jenkins Vulcan Spring Co. of Richmond, Ind., is entering into the production and distribution of Vulcan vizors on a large scale, according to a recent announcement.

Vulcan vizors will be produced in three types. A fixed type, universal for all closed cars with straight fronts, is known as type A. This will be, in effect, a part of the car itself, and the design is of so artistic a nature, states the manufacturer, that it blends harmoniously into the lines of the car.

It is said that the most careful engineering research was used as a basis for determining the length, slope and other dimensions of the vizor, to take care of the average type of driver.

The type B vizor is a universal, adjustable type for all closed cars.

The manufacturer assures us that Vulcan vizors are made of the very best grade of Armco rustless, cold rolled, No. 20-gage



Vulcan Vizor Blends With Lines of Car.

steel, and that they are non-rattling. The finish is a special dull black effect in baked enamel.

The vizors are designed to be easily applied and to operate satisfactorily after application is made.

Vizors are in great demand, as they are almost a necessity for protection from headlight glare, direct and indirect sun rays, rain, snow, sleet, etc.

Vulcan vizors are sold exclusively through the jobber trade. Further information concerning them may be obtained by writing to the Jenkins Vulcan Spring Co., Richmond, Ind.

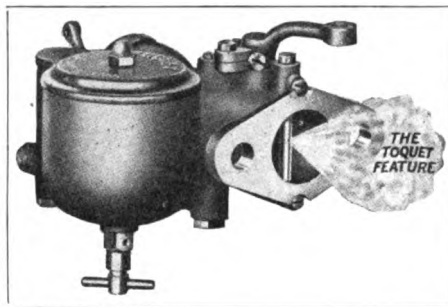
Toquet Perfects a New Carbureter for Ford Cars.

B. L. Toquet, a well-known engineer of Westport, Conn., has developed a highly efficient carbureter which is now being sold to Ford owners and dealers. Further Toquet models, for various other special installations on other makes of cars, are now well along toward completion.

This carbureter is the result of hundreds of separate tests, extending over a period of three years, and is said to be

already in highly successful use on over 20,000 Ford cars in all parts of the country.

The big mileage reports, together with reports of car operation, which are continually reaching the Toquet company in the



New Toquet Carbureter for Fords.

form of unsolicited owner endorsements, seem to indicate something unusual in carburetion.

The Toquet carbureter is the plain tube, fixed adjustment type, with no outside adjustment to be disturbed. This is said to render it immune from prying fingers inexperienced in carbureter action, and helps the Toquet company in backing up its product with a sweeping money-back-ten-day-trial guarantee.

Every Toquet is made for just one particular make and size of motor and must, therefore, deliver uniform results. Best action, under varied conditions, is thus assured.

In principle, the Toquet is of the two-jet design, having a main jet for high-speed work, which accomplishes a completely blended mixture of gasoline and air in exactly correct proportions. The big feature of the Toquet, however, lies in the auxiliary or low-speed jet, which is, in reality, in action at all motor speeds and has a very marked influence on the finer atomization of the fuel with its attendant economy and power development.

The Toquet auxiliary jet is located directly in the opening to the intake manifold where it is exposed at all times to the full suction created within the manifold. From the main jet, a lower channel delivers the usual mixture of gasoline and air to the auxiliary jet, where it is discharged at considerable velocity into the manifold.

At the point of discharge, however, the lower stream is met by a blast of pure air, also at high velocity, led down from an upper channel. These two fast-moving columns, meeting head on at the jet aperture, collide with tremendous violence and effectively smash into a completely-atomized vapor the tiny particle of fuel carried along by the lower stream.

This Toquet cross blast is practically a second vaporization, by which the fuel is literally pulverized into a perfect mixture

of remarkable explosive power. In this finely divided condition, the vapor will permit of more air per unit of gasoline, which burns very fast and very clean.

The Toquet carbureter is manufactured by the Toquet Carbureter Corp., at Westport, Conn., while the general sales offices are maintained at 1819 Broadway, New York City.

One Small Accessory Which Has Four Big Uses.

At last Ross had gained the interview he wanted. It had not been at all easy, for his prospect was one of the really important men of the town and generally the only encouragement a salesman was able to obtain from him was the usual "Mr. Baxter is very busy today and won't be able to see you."

However, his persistence was rewarded at last and, as he followed the office boy into the private office, he saw in his mind the coveted scrawl adorning the justly famous "dotted line."

Ross was a good salesman. His yearly record of sales of a certain well-known make of motor car proved that. He had had plenty of time to prepare his "sales talk" for this particular prospect and he met all the points raised skillfully. It really seemed that the sale was made when—

"Mr. Ross," said Baxter, "I like your car and I like your methods of doing business, and if I were buying a car for myself, I believe I should be inclined to buy,



Nojak Makes Tire Changing Easy.

but if I bought a car it would be for my wife's use as I haven't time to bother with one. I haven't yet been able to figure out how she would manage in case she were driving the car alone and had to make a

tire change. If I were with her, of course, it would be a simple matter to jack the car up and make the change, but that would be too much for her alone."

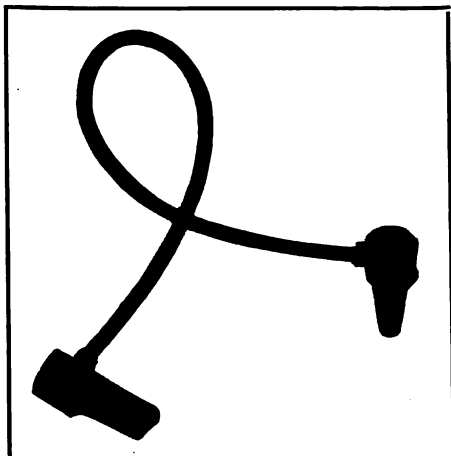
And no argument that Ross could advance seemed to offer a solution. As he left the office and walked up the street, Ross' quick eyes caught the details of each car that passed. One, he noted, carried a peculiar device attached to the spare tire at the back of the car and he was about to decide that it was some new type of tire guard when there was the sudden sharp explosion of a blowout and the car he was observing came to a halt a short distance away.

As he watched, he saw a woman step from the car, walk to the back of the car and take off the tire and the odd-looking device. Then he saw her take the contrivance and attach it quickly and easily to the wheel. Getting into the car, she drove it slightly forward.

Much interested now, Ross observed that this lifted the wheel sufficiently to give ample clearance under the tire. Then he noted the ease with which she made the tire change. At once the thought came to him that here was just the final argument that would make the sale which he had given up as lost.

He asked for the name of the device and was told that it was the Nojak, a popular new invention which makes it possible to make tire changes without the tiresome lifting and the soiling of clothing, as well as serving as a mud and sand hook to pull the car through heavy going, helping in putting chains on tightly and quickly, and making a useful tire guard.

It is needless to say that Mrs. Baxter is driving a new car now, which carries



"Rose Everlasting Battery Clip."

a Nojak, and Ross is adding to his sales with a pleasing steadiness.

The Nojak is always a convenience. It is inserted in two brass-protected holes in the felloe. Holes can be drilled in all wheels in about 20 minutes and the car is then permanently equipped for the use of the Nojak. The base is large, making it a sure stand on any road. A peculiar curved back keeps it snug on the wheel

when used to pull through sand or mud holes.

This device is supplied in the right sizes for all cars, at a moderate price, by the Commercial Mfg. Co., 1489 E. Fort St., Detroit, Mich.

New Rose Everlasting Battery Clip Universal in Use.

The Frank Rose Mfg. Co., of Hastings, Neb., manufacturer of Rose tire pumps and Rose grease guns, is just now placing upon the market a new battery connector, to be used for connecting batteries when on the charging bench.

The new clip will be known as the "Rose Everlasting Battery Clip." It is so called because of its lasting qualities.

The clip is made of a special compounded metal, which resists corrosion and will not be destroyed by the action of the acid. The cable, which is heavily insulated, is cast into the body of the clip.

This clip is so designed, it is said, that it is universal in use, fitting the different types of batteries now on the market. By pinching one end between the thumb and fingers the clip telescopes the post and, when the pressure is released, makes a firm connection.

By compressing the small or pointed end it can be slipped into the female type of post and the tension released. It also fits cables and flat bars, giving a perfect connection under all conditions.

Some of the advantages claimed by the manufacturers are: That the metal of which the clip is made resists corrosion and will not be destroyed by the action of the acid; that the heavily insulated cable saves the current lost in transmission over small exposed cables or wires, and the price is very low. Jobbers and dealers are requested to ask for information and prices.

Convenient Luggage Carrier Meets Long-Felt Need.

One of the most annoying of the problems which confront the motorist planning an extended motor trip is that of the disposition of his luggage.

Your customers will find a most satisfying solution of this difficulty in the Star adjustable luggage carrier and case, which is being manufactured by the Star Specialty Mfg. Co., 227-233 West Erie St., Chicago.

The carrier is made of steel, while the case is of "Fabricord" or automobile top material which completely encloses grips, suitcases, etc., and protects them from rain and dust.

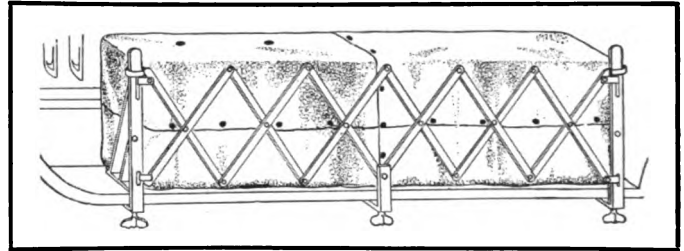
The device is adjustable to 50 inches with the carrier, and is made to be conveniently and firmly attached to the running board of the car. It can be supplied with straps for

keeping the grips, etc., from rubbing the body of the car, and all at a very moderate cost.

Write the Star Specialty Mfg. Co. for complete details,

And Now It's the "Do It Yourself, Owner," Equipment.

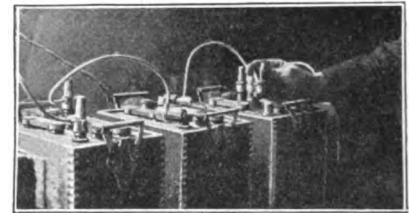
We've been told lately about the joys of the "serve yourself" garage and service station, and now we are being introduced to an equipment by means of which the



Star Adjustable Luggage Carrier.

car owner may have his own service station which may be conveniently placed in the private garage, cellar or in an outbuilding.

It is most important, in order that a car may be kept in efficient running order, that it be kept in proper adjustment, and many times it is not practicable for the owner to



Showing Rose Battery Clip Connected.

take his car to the garage or repairshop for such adjustments as promptly or as regularly as is desirable. Neglect is often responsible for accidents. In a great many cases, the car owner would be glad to take care of minor repairs for himself if he could only have the necessary assortment of tools and equipment.

The Motoquip has been designed for the purpose of filling this need. It is a sturdy, scientifically constructed, maple top work bench, equipped with over 50 high-grade tools and devices for adjusting, repairing and keeping the car in perfect condition. With such complete equipment, the owner-driver or chauffeur is enabled to make many of the necessary adjustments on the car himself without having to visit the repairshop or garage.

On the backboard of the Motoquip is a silhouette of each tool painted red. This is an aid to rapid and efficient repairing, for it tells you at a glance where the tool belongs that you are through using and shows when a tool is missing, thus keeping a constant check on your equipment. If any of the tools are loaned, the borrower's name, written on a tag, can be fastened to the tool hook or hole.



BURD

High Compression

PISTON RINGS

The World's Standard of Efficiency

Burd High Compression Piston Rings give 100% efficiency—maximum power—at the lowest expense for gasoline and oil—and prolong the life of the motor by keeping it clean and free from carbon. They are unequaled for lasting resiliency and permanent efficiency, therefore, give better service at the end of six months than when first installed.

There is no waste—no loss—no escape of gas past the piston rings—no pumping of oil.

The Burd Compensating Guard seals the ring positively against any leakage at the ring opening and automatically compensates for the wear of the ring, adjusting itself to the cylinder wall, insuring gas and oil-tight high compression. This guard is of a special alloy having great tensile strength. It is of the same hardness as the ring and takes its wear uniformly with the ring from the cylinder wall. It is impossible therefore, for Burd High Compression Piston Rings to score the cylinders or wear a cylinder wall.

Backed By This Guarantee

Every Burd High Compression Piston Ring is *Guaranteed* to be free from defects in material and workmanship—and Warranted to give more power, with less fuel consumption, than any other piston ring—when installed in cylinders that have not been warped or scored—or your money will be refunded, after thirty days' use.

For Sale By All Jobbers Everywhere

BURD HIGH COMPRESSION RING CO., Rockford, Illinois, U. S. A.

Sales Offices in the Following Cities:

Atlanta Baltimore Boston Chicago Philadelphia New York Kansas City Des Moines San Francisco Dallas Seattle
Winnipeg Buffalo Cincinnati Detroit St. Louis Indianapolis Cleveland Minneapolis San Antonio Los Angeles

From the small one-inch screwdriver to the large tube testing tank, you will find "built-in" quality. Each tool bears the stamp of a well-known and reputable maker.

The Motoquip may be placed in any convenient location, for it is not so large but what it will fit into the smallest garage, leaving sufficient floor space to allow working on either side and ahead and behind the machine.

The Motoquip is not strictly confined to the repair of automobiles, motor-boats, trucks, motorcycles and tractors, for the progressive farmer of today is using gasoline-driven lighting plants, lawn mowers, wood saws, stump pullers, ensilage cutters, threshing machines, hay presses and water pressure systems. He is, therefore, constantly in need of serviceable equipment for keeping his machinery in good working order and preventing against loss of valuable time and money.

Even in the home, there are many repairs to heating, lighting or water systems which may easily be handled if the proper tools are at hand, without calling in the repairman. With the Motoquip, you are supplied with such tools.

The specifications of the Motoquip are:

A work bench, solid front, maple top, which is scientifically constructed of the best selected wood. All surfaces are finished to prevent oil from soaking in and prevent marking. It is of mortise construction throughout. **The backboard is glued, making a solid and durable bench that will stand up under the most severe treatment.** It is fitted with a large drawer for miscellaneous tools, appliances and tire repair material, etc. Each tool coming into con-

in oil and grease. It is built of strong wood, natural finish, with a neatly upholstered head rest. There is a rack on each side for holding tools and parts, and the creeper is fitted with ball-bearing casters. It is strong and substantial and fits conveniently under the bench.

A stationary type vise with 3-inch jaw, opening $3\frac{1}{2}$ inches. The material is well distributed, all vital parts being reinforced. It is said to be practically unbreakable and will last for years. The grip is positive and allows no slip. This vise weighs 22 pounds.

In workmanship, design and mechanical construction, the grinder furnished is said to be in a class by itself. Every part, from gear to handle, is accurately made and carefully assembled. The gear case is made of the best grade of gray iron, and all parts subject to strain are of malleable iron. It is fitted with an adjustable tool grinding guide and a 5-inch diameter wheel which is one inch in thickness, with a $\frac{1}{8}$ -inch hole, medium grit. Each machine is equipped with a carborundum wheel. This grinder is efficient and durable, combining high speed and power in the right proportion to obtain the best results.

The tube testing tank, for locating small leaks, will be found invaluable. This is made of heavy iron, double-seamed construction, heavy wire around the top, and galvanized, thus, it is claimed, being made absolutely rustless. The rod which supports the tube allows the free use of both hands and is adjustable to all sizes of tubes. The tank is filled with water and the supporting rod adjusted to the proper height, and the tube is then hung on the rod and turned around until air bubbles appear showing the location of the puncture.

To complete the equipment there is an ample assortment of wrenches, pliers, screwdrivers, punches, files, and, in fact, all the various tools necessary for the work of the automotive repairman.

What car owner would not be delighted with such an equipment. Dealers and others interested may obtain complete information by writing to H. C. Dodge, Inc., Motoquip Division, 32 Alger St., Boston, Mass.

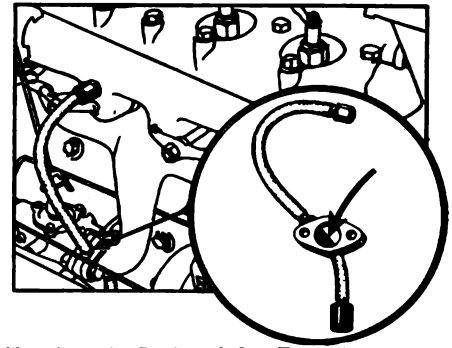
Scoe Hot Spot Will Add to the Efficiency of Any Car.

The Briscoe Devices Corp. of Pontiac, Mich., manufacturers of the Scoe carbureter, have just developed the Scoe Hot Spot, which is a vaporizing unit for garage installation on various makes of cars.

The Hot Spot is a low-priced vaporizer, and is designed for easy application without special facilities. The only tools required are a $\frac{5}{16}$ -inch drill and a standard $\frac{1}{8}$ -inch pipe tap, the same size used for grease cups and priming cups. The vaporizer itself is made in the form of a flange, which is inserted between the carbureter and the intake manifold, longer carbureter bolts being furnished.

On one side of the flange, a thin copper tube, $\frac{3}{8}$ -inch in diameter, runs through the passage. This tube is constantly heated by exhaust gas passing through, and is hot enough to be an efficient vaporizing surface.

At all moderate speeds the position of the



Hot Spot is Designed for Easy Application.

carbureter throttle valve is such that the mixture is directed against this hot tube while it is still in the form of a spray. It requires far less heat to convert spray into vapor than to vaporize the liquid gasoline after it has collected on the inside of the manifold.

Tests made by the manufacturers show that the heat provided at this point will vaporize the gasoline effectively without loss of volumetric efficiency.

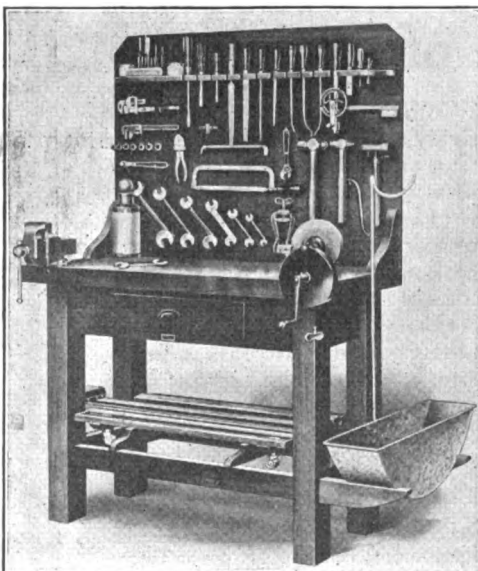
The exhaust gas is conducted from the manifold through a copper tube, heavily insulated with woven asbestos to conserve heat. The attachment to the manifold is made by a compression coupling with a standard $\frac{1}{8}$ -inch pipe thread and with the inner passage drilled out to $\frac{9}{32}$ -inch to allow the maximum discharge possible.

It is said that tests made by the manufacturers with the Ford installation show that the regular carbureter setting may be cut down at least $\frac{1}{4}$ of a turn (45 degrees) with the same effective mixture in the cylinders, as is shown by the fact that even with the reduced consumption there is a slight increase in power and improvement in acceleration. The gasoline saving with this setting runs from four to six miles per gallon.

An important advantage which results from the reduced fuel consumption is the fact that there is less unconsumed fuel to be reckoned with in the cylinder.

The results of over-richness from poor vaporization are usually manifested in one cylinder more noticeably than in the others. This is due to the fact that a considerable part of the fuel reaches the cylinders by creeping along the inside of the manifold wall. In turning the corners, it naturally follows the outside wall and, in entering a pair of cylinder ports, is discharged into the cylinder adjacent to this wall.

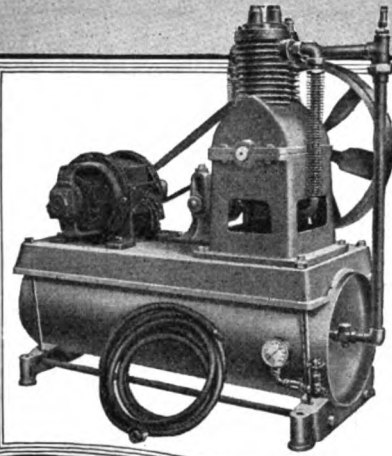
The advantage in vaporizing the fuel before it reaches the manifolds lies principally in avoiding this unequal discharge, inasmuch as a vapor can be distributed evenly by a manifold of almost any design.



Motoquip—The Home Service Station.

tact with the backboard has a silhouette painted in red.

A combination creeper and tool rack. This is a practical and convenient device enabling you to work under the car in a comfortable position, and so avoiding lying



CURTIS TWO-STAGE AIR COMPRESSORS

An Original Design

Curtis Two-Stage Compressors embody every good feature of single-stage plus two-stage efficiency. Have all the exclusive features that established our single-stage so firmly on the market—and in addition have all possible advantages of two-stage compression.

Aeroplane type COPPER inter-cooler with thin copper radiating fins rigidly attached, assuring most efficient cooling and fullest advantage of two-stage compression. Built in several styles in two capacities. Ask your jobber. Insist on a Curtis. Rather than accept a substitute, write us direct.

FREE
CURTIS AIR
FREE FROM OIL

Curtis Pneumatic Machinery Co.

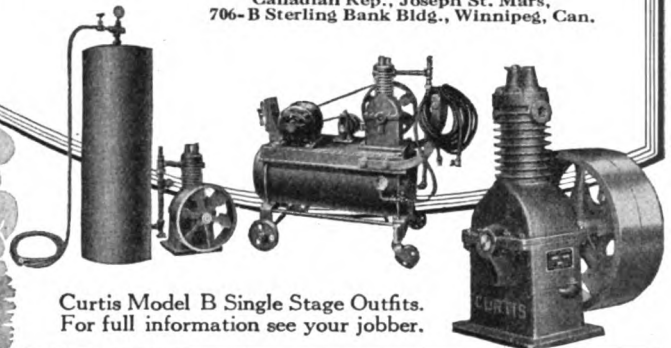
1515 Kienlen Ave.

St. Louis, Mo.

Branch Office:

530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.



This is Repair Time!

Instead of buying new cars this year, many people are working the old cars "overtime". Garagemen are finding that *this is repair time*. When shops are busy and time is precious Kester Acid-Core Wire Solder—which is a "self-fluxing" solder—proves its worth. For soldering generator connections, or any other automotive soldering jobs, you can't beat



How to Tin Iron

Soldering copper *must* be clean—file copper till it shows bright. Copper must be heated quite hot so it will melt solder. Apply Kester Acid-Core Wire Solder.

Chicago Solder Company
4210 Wrightwood Ave. Chicago, Illinois
Clip the coupon! Ripe for the picking!

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago.
Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder

Name

Company

Address

City State.....

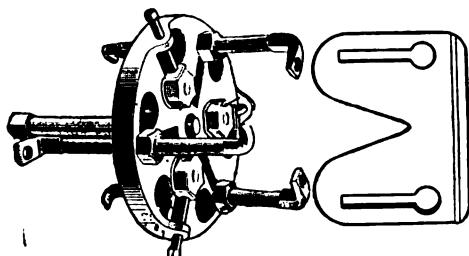
Our Supply House is.....

Up-to-the-Minute Garage Equipment

The Tool With the Pull—It Has Many Uses.

A single tool, combining many practical uses, is being offered in the F & W Universal wheel and gear puller now being marketed by Lewis & Milligan, Inc., 2108 Boulevard Place, Indianapolis, Ind.

Among these uses are the following:



Wheel Puller of Many Uses.

Pulling wheel from the floating axle; pulling wheel by direct hub thread engagement with threaded blocks; pulling steering wheel; pulling gear with arms; pulling motor boat propeller; and pulling magneto coupling. It may also be used as a portable arbor press and for straightening a connecting-rod.

The F & W "Senior" is supplied with hex blocks with six different threads, hardened. It has nickel steel arms which are heat treated and squared to prevent turning in the slots, and it is further equipped with a heat treated power screw and a malleable iron disc and plate.

The F & W "Junior" is fitted with hub rings for Ford wheels.

Detailed information concerning this excellent tool may be obtained by writing to the manufacturer.

Vise Saves Pistons—Under Worker Gives Comfort and Efficiency.

A very practical and valuable shop tool, which is certain to find favor with garage-men, is found in the Manley universal piston vise.

It is said to be instantly adjustable for the complete range of automobile pistons, thus eliminating damaged and broken pistons. The jaws of this vise may be adjusted to fit any piston within its range in one minute. It is only necessary to place the piston in the vise somewhere near center, bring up the back jaw until they touch the piston, tighten the two cap-screws, and then bring up the front jaws and tighten one more cap-screw.

The front jaw on the Manley vise works on an eccentric with a very small throw, so that its grip is very powerful.

Another important feature of the Manley vise is the large hole in the center,

permitting the connecting-rod to pass through when it is desired only to remove or replace the rings and not disturb the rod.

The Manley piston vise is substantially made of cast iron finished on the top plate and on the inside and under-side of the jaws so that it is perfectly square.

The range of diameters of pistons handled is from 2 11/16 inches to 5 5/16 inches. Its weight is 15 pounds.

Another excellent addition to garage equipment will be found in the Manley floor-level under-worker, which is designed for elevating the front or rear end of a car to work on the under parts of the chassis.

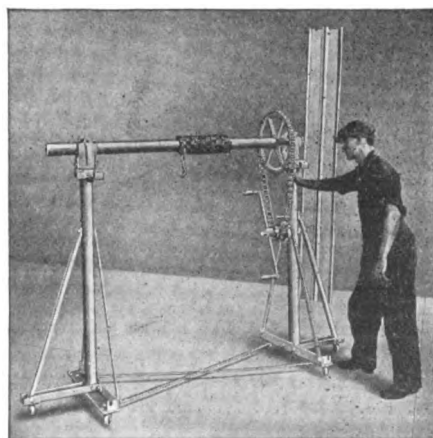
The Manley floor-level under-worker is a thoroughly practical device, said to be absolutely safe and to allow the car to be raised to any height, thus taking the place of the old-fashioned pit which involves a great amount of inconvenience in working as well as discomfort to the workman.

This device is instantly collapsible to place out of the way when not in use or to move from one position to another in the garage; is simple in construction, portable on its own casters, and its inclined working position is ideal for the mechanic.

Since the car may be elevated to any height desired, the mechanic can work to advantage sitting in a perfectly natural position, and can see exactly what he is doing as the whole under part of the car is exposed to view, permitting him to use his speeder wrenches and other tools in a natural way.

It is said that the Manley under-worker, on account of its almost instantaneous position changing feature from one car to another, makes it entirely practical to raise the car for even minor repairs and adjustments.

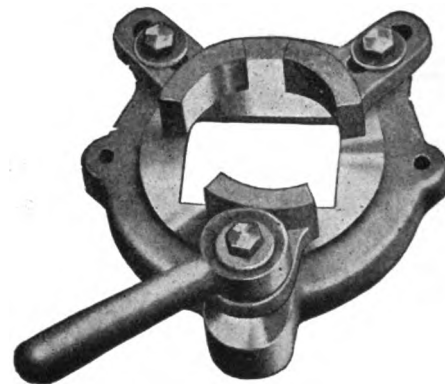
The Manley under-worker is built



The Manley Under-Worker Elevates Car to Any Desired Height.

throughout of steel and cast iron, with ample factors of safety for strength. The two tracks are six-inch channels, stiffened in the middle. The rods tying these channels to the front unit are steel.

The uprights are 2½-inch steel pipe, resting on heavy angle steel bases and thoroughly braced in three directions.



The Manley Piston Vise.

The horizontal chain drum is a 2½-inch pipe, constituting the top frame for the front unit. This drum rotates in open cast iron boxes fitting over the uprights. These open boxes permit of easily and quickly taking the complete under-worker apart if desired.

The pipe drum is revolved, thus wrapping up the chains and pulling the car up the tracks by a sprocket wheel and chain. The small sprocket wheel revolves on a heavy stud bolted at a convenient working height through the right hand upright.

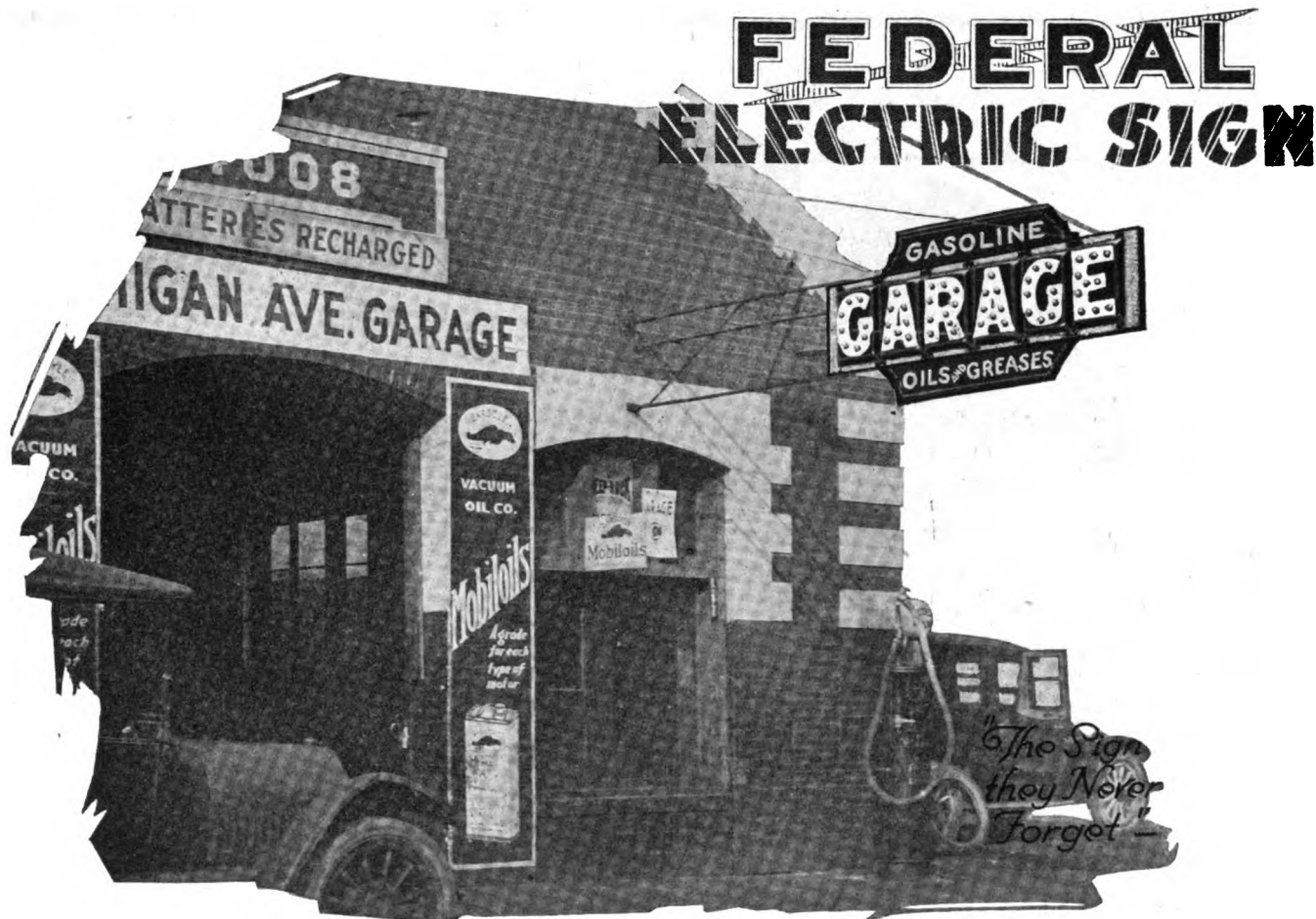
The ratchet wheel is directly back of the sprocket wheel and the pawl is secured to the upper stud, which also supports the chain guard.

Both these important additions to up-to-date garage equipment are manufactured by the Manley Mfg. Co., York, Pa., who will gladly supply complete details upon request.

New HB Air Compressor Outfit Absolutely Automatic.

In the new automatic air compressor outfit, which is being brought out by the Hobart Brothers Co., Troy, Ohio, all gears, pulleys and belts are eliminated, the air pump being built directly upon the shaft of a low-speed ball bearing motor. The pump operates in oil. It is claimed that this is a very silently-running outfit and that it requires little current for operation.

The outfit is absolutely automatic, starting and stopping itself, and maintaining a constant air pressure of between 150 to 200 pounds. Once the outfit is installed, it is said that no further attention is necessary for your free-air system.



—It Gets the Business



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

Because their garages are lost in darkness, many garage owners lose many sales. Their competitors, with glittering electric signs lighting up their garage front, pull much of their paying profits away from them.

Prospective customers will not waste their time trying to find you. They know what they want and need and will go direct to that garage that advertises for their

patronage—a Federal Electric Sign draws them like a magnet.

And an electric sign is really the most inexpensive of advertising media. Costs but a few cents a day for electricity. Made of porcelain enameled steel—will not rot, rust or fade, and will last indefinitely.

Gain a step on competition. Send coupon today for full details, prices and **free sketch** showing how your sign will look.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information **prices and free sketch of a Porcelain-enameled Steel Sign** for my business. Explain your **12-months-to-pay Plan**.

Name City State

Street and No. Business

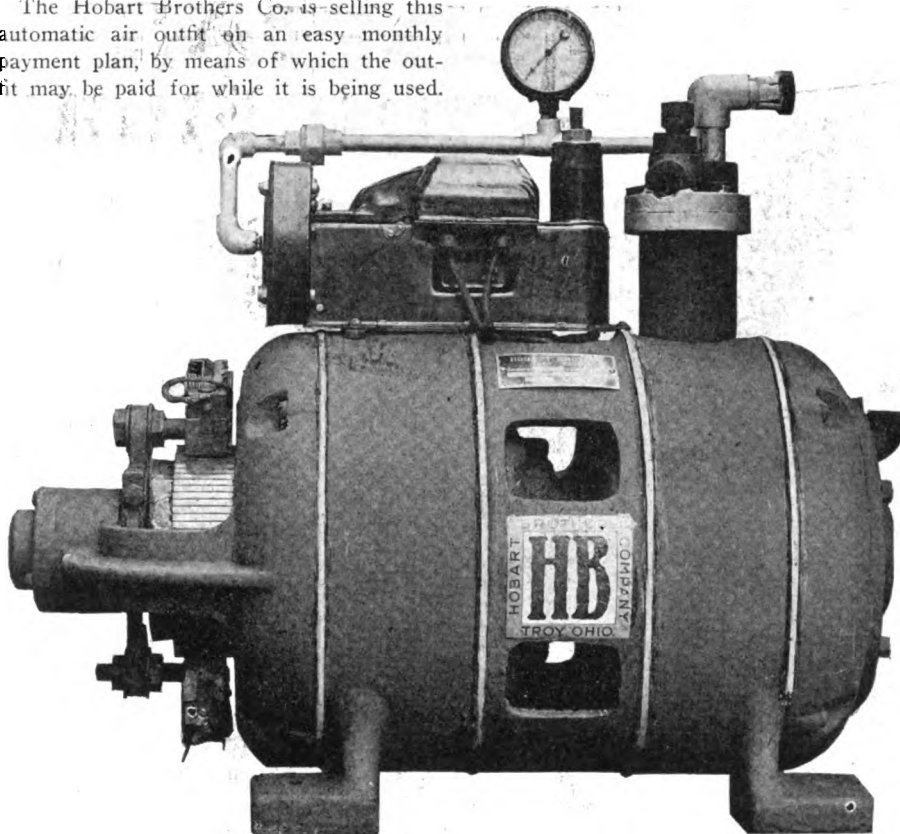
Store Frontage No. of Floors

7

AGAD-

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

The Hobart Brothers Co. is selling this automatic air outfit on an easy monthly payment plan, by means of which the outfit may be paid for while it is being used.



The New HB Automatic Air Compressor Outfit.

The further statement is made that, because of its simplicity, it is possible to offer the outfit at a very reasonable price.

Full particulars may be obtained by writing the Hobart Brothers Co., at Troy, Ohio.

Radially Adjustable Cutters A Feature in This Boring Machine.

A new boring machine is soon to be placed on the market, the special feature of which is a cutter-head containing six cutters which are radially adjustable in diameter and operated by means of a plate with a spiral raceway or thread which engages grooves cut into one side of the cutters.

This adjustable plate also serves the purpose of a clamping plate connected to the end of a bar extending through the spindle and which carries on the other end an index plate and locknut.

The index plate is graduated to read one-thousandth of an inch, so that the radial adjustment of the cutters can be determined thereon, thus eliminating, it is said, the necessity of using a micrometer to determine the diameter of the cutters after setting or when set to a required diameter.

This size cutter-head is adaptable for boring cylinders from three to four inches. When the cutters register three inches in diameter, the index wheel would register zero. Any adjustment in excess of three inches can readily be determined on the index wheel. The cutters are made of a special grade of alloy steel and are heat-treated to withstand hard usage.

The spindle is made of a piece of steel tubing and is ground to a perfect sliding fit after all machining operations have been performed. This spindle is keyed to a sleeve contained within the housing, from which it derives its motion. This sleeve is fitted to rotate within the housing and derives its motion from a worm gear. The worm is mounted on the shaft, which also carries the balance wheel.

Directly over the worm gear is a semi-floating type of gear, the teeth of which also engage the worm. This gear is supported by a portion of the sleeve which is in the form of a flange and is so fitted as to freely rotate thereon.

The worm gear that is securely fixed to the sleeve contains 22 teeth. The floating gear contains 24 teeth and, freely revolving on the flange portion of the sleeve, sets up a differentiating action. Advantage is taken of this action by interposing a pinion gear which is carried within the sleeve and receives its revolutions from the floating gear and transmits its motion to the rack which is cut into one side of the spindle.

This pinion gear is arranged so as to be engaged or dis-engaged at will, thereby providing means for feeding the spindle carrying the cutter-head, to the full length of the cylinder, where it is instantly released allowing its withdrawal. The lower portion of the housing is arranged with a flange nearly surrounding it, which permits of its being clamped to the flat surface of an engine cylinder-block.

For boring a cylinder, the tool is placed

on the top of the block, the cutter spindle lowered approximately one-half inch within the original bore of the cylinder, the lock-nut slackened, and the cutter-head expanded to the bore of the cylinder and clamped into position.

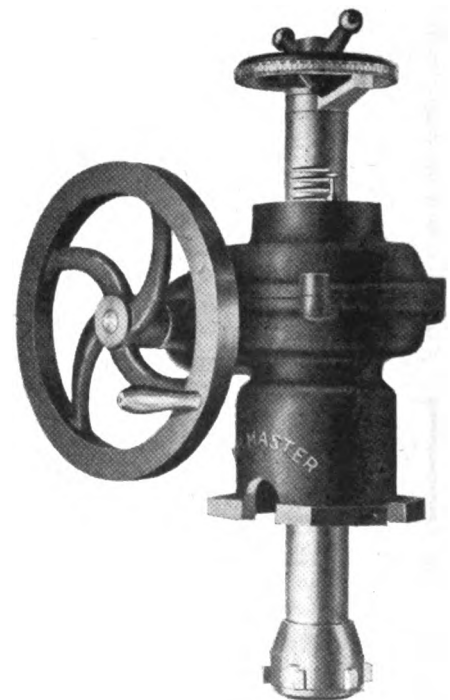
Then the spindle is withdrawn from the cylinder, the cutting diameter of the blades set to the size desired—this being readily determined on the index wheel—and the blades securely locked by means of a lock-nut on top of the index wheel. The pinion gear is engaged with the rack of the spindle by pulling upwards on the shift pin and revolving the balance wheel.

The machine is so arranged, it is said, that a feed of 25/1000ths per revolution of the spindle may be obtained, giving 40 turns per inch, and geared with a ratio of five to one from the worm shaft and will feed through the average cylinder when operating by hand in less than ten minutes.

After the cutting-head has fed through the length of the cylinder, the lock on the top is released and the cutting diameter reduced. The feeding gear is then disengaged and the spindle pulled up out of the cylinder. After unbolting the clamps, it is ready to move to the next cylinder for boring.

The device is furnished as shown, for hand power, and is equipped with a small electric motor mounted directly above the worm shaft. The operator is enabled, it is claimed, to bore a cylinder in approximately five minutes.

The best of material is used throughout



A New Boring Machine Which Has Six Radially Adjusted Cutters.

the construction of this machine, and all wearing parts are made sufficiently heavy to withstand continuous operation. These tools will be furnished in three sizes, covering cylinders from two to five inches. All

Why This Sign Makes Sales



It's Big—

Over six feet high.

It's Attractive

Painted in four brilliant colors.

It's Life-like

Cut out all around and looks like a real giant boy.

It's Amusing

The clever, witty sayings on the slate make people laugh.

It's Always New

Sayings are changed every other day.

It's Exclusive

There is nothing else like it. Both the sign and the sayings are copyrighted.

THIS Boy and Slate sign is making a hit with the public and producing sales for dealers all over the country. The size and unusual make-up of the boy compels attention. The witty sayings which you chalk on the big slate every other day, always get a reading and a laugh. People like them and come back for more. We supply enough of these sayings to last a year. There isn't anything that will make you and your business so much talked of and thought about—nothing that will so help to make sales.

Send Today For Our Offer

Write for this sign and particulars about our scientifically Refined En-ar-co products, the satisfaction builders. Get our extremely liberal dealers proposition. We make En-ar-co Motor Oils, En-ar-co Gear Compound, White Rose Gasoline and National Light Oil (kerosene), which are the highest types of scientific refining on the market. Send the coupon in today.

THE NATIONAL REFINING CO.
National Headquarters, E-731 National Bldg., Cleveland, O.
4 Modern Refineries—100 Branch Offices

THE NATIONAL REFINING COMPANY

E-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

I now sell.....oil.

parts have been standardized and are readily interchangeable.

Cutters can be furnished in either carbon-alloy or high-speed steel, although the manufacturer recommends carbon-alloy cutters for the reason that they maintain cutting edges longer.

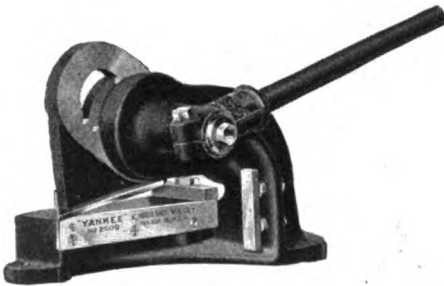
Further information concerning this new boring machine may be obtained from H. D. Taylor, 1744 Hibbard Ave., Detroit, Mich., The Master Devices Co., by all who are interested.

"Yankee" Cutter Gives Clean, Square Cut on Brake Lining.

Designed for quick, clean and easy cutting of brake lining and belting of all kinds, up to 6 inches wide and $\frac{3}{8}$ -inch thick, is the new "Yankee" cutter No. 2000, manufactured by North Bros. Mfg. Co., Philadelphia, Pa. This tool, however, is not intended for cutting metals.

The power is secured through a rack and pinion movement, operated by a lever. The bevel and cutting angle of the knives are the result of careful study and experiment for the purpose named and the construction, it is said, insures durability, clean cut and ease in operation.

The knives are of the highest grade steel, carefully ground and fitted. Adjustment,



The "Yankee" Gives Clean, Square Cut.

in case of wear or regrinding, is provided for on the lower knife by three screws and set screws.

In order to insure work lining up at right angles to the knives, adjustable guides are provided on the base and frame. That on the frame is made long enough to secure bearing when the brakelining or belting curves up or down as it comes off the roll. The frame of the cutter is strong and substantial, of cast iron, and finished in dead black.

The "Yankee" cutter has a capacity of $\frac{3}{8}$ by 6 inches, extreme length 11 $\frac{1}{2}$ inches, height closed 7 inches, height open 8 $\frac{1}{4}$ inches, width 7 $\frac{1}{4}$ inches, length of the handle from the center 13 inches. The net weight is 22 pounds, while the gross weight, packed for shipping, is 29 pounds.

When used for cutting belting in a factory the "Yankee" makes a clean square cut ready for lacing without trimming or truing.

Complete details may be obtained by writing to the manufacturer.

Built for Real Service Are the Utica Compressors.

An air compressor that is built for real service and will at all times furnish clean, cool air, is the promise of the Utica Compressor Co. to its patrons.

The Utica compressors are well designed and sturdily built. The wearing parts are of ample proportions, the material the best obtainable and the workmanship of the highest order. They have every refinement that makes for efficiency and durability. The few working parts and the entire absence of intricate mechanism make them splendid compressors where mechanical skill is not always available.

Every part is built accurately to gauge in the Utica company's own plant, which is equipped with the most modern machines of all kinds.

The lubrication system of this compressor is by regulated automatic splash. Two spoon attachments on the crankshaft dip down into the oil in the crankcase, splashing just sufficient oil to properly lubricate the cylinders of the compressor. By a special feature in design no excess oil is carried into the discharge line. A high and low level filling gauge is furnished by which the height of oil in the crankcase may be determined.

The main bearings are die-cast babbit. They are extra long and are fitted with proper oil grooves. The crankshaft is of high carbon drop forge steel. The connecting rods are bronze castings with provision made to take up on the crank end.

The inlet valves are built as a unit and can be readily removed for inspection. A safety valve is provided on the cylinder head and can be easily regulated for any desired pressure. Provision is made to prevent broken valves from dropping into the cylinder.

The motor-driven compressors are connected by cloth pinion gears, which reduce the noise in operation to a minimum. Where the absence of this slight noise is an essential feature, the manufacturers recommend the use of the belt-connected units.

Designed for many uses, particularly in garages, service stations, laboratories, compressed air water supply systems, air brush painting, machine shops, foundries and other purposes requiring compressed air, the Utica compressors will undoubtedly prove a desirable addition to the equipment of any garage and add materially to its efficiency.

The company's engineering force will gladly furnish any information desired concerning garage compressor equipment to those interested. Write the Utica Compressor Co., Inc., Utica, N. Y., for detailed information.

The "Hot Baby" Torch a Wonderful Little Worker.

In the summer, particularly, one likes to save himself all the work and time and worry he possibly can. For this reason, the No. 1 Hot Baby torch will prove a welcome addition to the garageman's or repairman's shop equipment. Through its use the efficiency of the workman may be increased, thus economizing in time and money.

It is a four-in-one unit oxyacetylene cut-



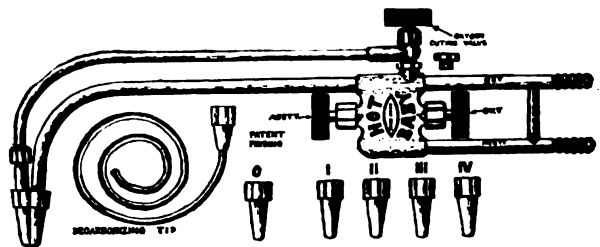
Utica Well Designed and Sturdily Built.

ting, welding, lead-burning and decarbonizing tool, the combination giving the user the satisfaction of knowing that the troubles of connecting special torches for each operation are eliminated, thereby saving time and worry.

The construction and finish of the Hot Baby torch, it is claimed, cannot be excelled, as every part is made of the best hard drawn brass and copper stock. No casting is used for the tips, as these are machined from the solid bar and all joints are silver brazed. The construction of the valves is so conveniently arranged as to be in a grip of the operator's hands at all times.

The regulators and gages are of special design so as to meet the requirements of the No. 1 Hot Baby torch.

It is said that the work which this torch will do is surely surprising for its size. It will cut metal 1 $\frac{1}{2}$ inches thick easily and



"Hot Baby" Torch Saves Time and Worry.

will weld cast iron $\frac{3}{4}$ -inch thick from a cold start. The manufacturer states that the torch is practically unlimited if the work is pre-heated, and decarbonizing and lead burning are handled very efficiently at a small expense.

So nicely arranged is this torch that the cutting unit can be detached in a few seconds, thereby converting it to a welding



Give a receipt and get all your money

The right way to handle a sale

- ① Collect the goods at the wrapping counter beside the register.
- ② Tell the customer the price and get the money.
- ③ Register the sale.
- ④ Wrap the receipt in the parcel.
- ⑤ Give the parcel and change to the customer.

The customer gets quick service.
The clerk gets credit for making the sale.
The merchant gets all of his profits.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL

CASH REGISTER CO.

DAYTON, OHIO.

★A -1.50 -0126 JUN 10-21
Printed Amount Date
 THIS IS A RECEIPT FOR YOUR
 PURCHASE.
 THE RAND-JOHNSON CO.
 NEW YORK

Wrap this receipt in the parcel.



Get this record inside the register.



And get all your money.

and lead burning torch, simply by screwing on the size tip desired.

The Hot Baby torch is 13 inches long, and the width over the grip is $1\frac{1}{2}$ inches. It is furnished complete, as follows: One lead burning tip No. O; one cutting unit with special double tip head; four welding tips, Nos. 1, 2, 3 and 4; one cutter replacement plug; and one decarbonizing tip.

The B. E. Hicken Sod-Tor-Lite Co., Prairie Hill, Mo., which manufactures this exceedingly useful tool, will gladly supply detailed information concerning it to those interested, upon request.

A Universal Garage Lathe Which Gives Satisfaction.

Sturdiness of build and efficiency in action are the outstanding characteristics of the 14-24-inch sliding extension gap lathe which the Barnes Drill Co., Rockford, Ill., is now offering to garages and repairshops.

This is a very versatile tool which will be found valuable for many types of jobs. It is particularly useful in general repair work for the reason that it permits the

tionally large diameter and is strongly back-geared, giving eight changes of speed. A push pin on the head gear allows the cone to be instantly locked or unlocked without the use of a wrench.

The tail-stock is of the off-set type, allowing the compound rest to be set parallel with the bed, and has set over adjustment for taper work.

The carriage is extended in front and it is unusually strong, to provide a firm support for the turning tool when doing work in the gap up to the limit of its swing. The carriage is fitted to the bed with the long bearing on the V in front and with the flat bearing at the rear, and is fed by a splined screw. It is thoroughly gibbed, and can be conveniently and quickly clamped to the bed for cross feed work. The carriage is also fitted with T-slots for clamping on work.

The compound rest has a graduated base, is properly gibbed, and has sufficient travel for the largest capacity of the lathe.

There are six quick-change geared feeds, both longitudinal and cross. The feeds

Overhaul Rear Axles Easily With Dearborn Rear Axle Stand.

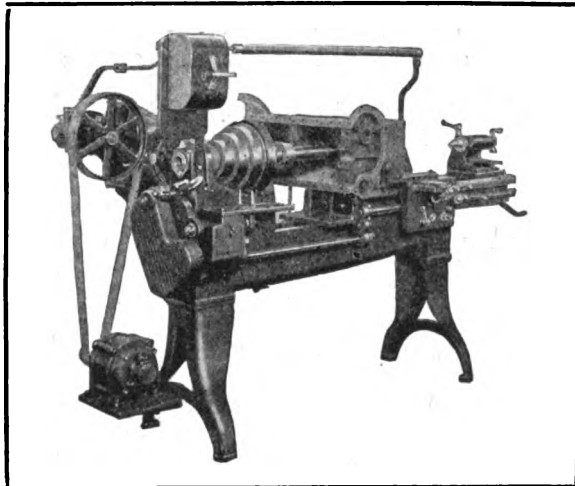
The garageman who has been putting up with the inconvenience of having to overhaul rear axles on the shop floor, thus losing a large amount of time and having to work in the grease and dirt from the axle, will undoubtedly find the Dearborn rear axle stand, No. AB-2, a valuable addition to his shop equipment.

This rear axle stand is intended for the axle with housing to $4\frac{1}{2}$ inches in diameter.

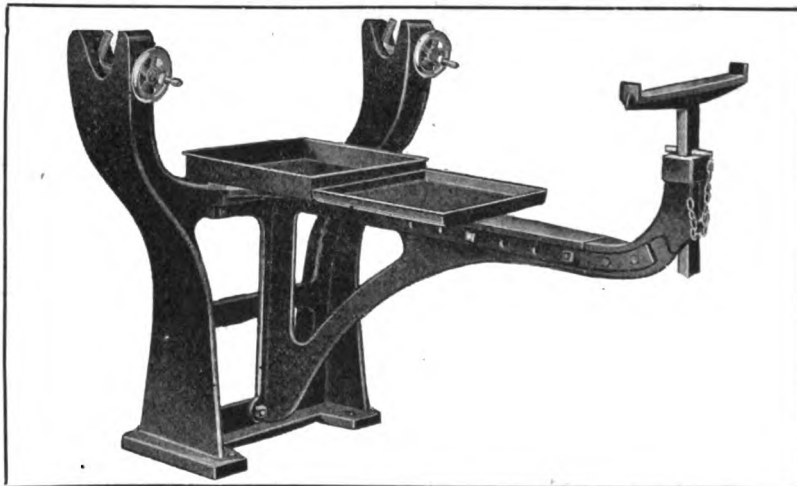
It is so constructed that it may be used when overhauling rear axles of the worm-drive type as well as the bevel-gear type, as the drive shaft is maintained in a horizontal position by the adjustable support when work on the worm-drive axles is being done.

The clamping jaws, with which the axle-shaft housing supports are equipped, are operated individually by hand wheels, thus allowing the housings to be secured in any position desired.

It is fitted with a removable grease pan



Lathe That Is Particularly Adapted for Repair Work.



The Dearborn Rear Axle Stand Simplifies Overhauling.

swinging of pieces of large diameter through the gap. It is also a very convenient lathe for fitting and assembling work in factory machine shops. The sliding extension gap is said to be an especially advantageous feature.

The bed is broad, deep, well-braced, and accurately proportioned throughout. The top and main beds are planed full length and fitted together by dove-tail construction, which permits the top bed to be firmly held at any point by means of clamp bolts transversely placed through the main bed.

For extending the gap, the top bed is drawn back by means of a screw and crank at the rear end. The rack and pinions are cut from steel, the rack being in one piece.

The headstock is heavy and strong. The spindle is very large and is made from the best grade of machinery steel, accurately ground, and it runs in split Lumen bronze bearings which are carefully scraped and fitted.

The cone pulley has four steps of excep-

are as follows: 0.007", 0.011", 0.017", 0.019", 0.030" and 0.045". Cuts either right or left-hand threads consecutively from 2 to 18, including $11\frac{1}{2}$ pipe thread; by twos from 18 to 36; and by fours from 36 to 48.

The taper attachment is secured to the back of the carriage and travels with it. It turns any taper up to two and three-fourths inches per foot. The swivel guide bar is graduated in inches, and is adjusted by means of a hand-screw.

This gap lathe is furnished with a self-contained motor drive which makes it a very neat and convenient outfit for garages and isolated places where there is no line shaft but where electric current is available.

The increasing number of passenger cars and rapid expansion in use of trucks and tractors necessitates adequate repair shop facilities. This excellent new tool will be a useful addition in any shop.

For further details concerning this tool, write to the Barnes Drill Co., 814-830 Chestnut St., Rockford, Ill.,

and a tool tray, 12 ins. by 14 ins. and 14 ins. by 14 ins., respectively. The width of the stand is 33 ins., the height 36 ins.; length closed 44 ins.; length extended 60 ins., and the weight 200 pounds.

The Dearborn Equipment & Hinckley-Myers Co., general sales department, 1503 Tower Bldg., Chicago, will gladly supply any further information desired upon request.

Paragraph.

THE AMERICAN AERO Co., Chicago, manufacturer of the Juelson two-bladed fan for automobiles, has just been reorganized. The newly-elected officers and directors are as follows: President and treasurer, F. H. Wellington, South Bend, Ind.; vice-president, Col. George M. Studebaker, South Bend; secretary, Paul V. Harper, Chicago. Board of directors: F. H. Wellington, Col. George M. Studebaker, Clement Studebaker, Jr., Edward S. Hyman and Edwin Juelson. The administrative offices are now located at South Bend, Ind.



Here!
Use
discretion



Don't Be a Mutt
You don't need to pay a fancy price for a good spark plug any longer.

Get a
Little Jeff

Guaranteed to give complete satisfaction.
Durable — Efficient — Economical

They sell at retail for **Fifty-five Cents**
A new plug for 25c if the porcelain breaks from any cause within three years.

General Accessories Corporation
Chicago

Write us today for dealer prices

GENERAL ACCESSORIES CORPORATION
Chicago



Oplex Signs Bring Sales in Dull Times

FLEXLUME Oplex Electric Sign above the door of the showroom or garage is strong sales producing advertising. There is no advertising more effective, none that can be had at such low cost—only a few cents a night, and you reach thousands of people. The daytime advertising is free.

Flexlume Oplex Signs are the kind with the raised, snow-white glass letters—perfect day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, better illumination and most artistic designs.

Let us send you a sketch showing a Flexlume Sign for your business

FLEXLUME SIGN COMPANY
25 Kail Street Buffalo, N. Y.

Here and There in the Motor World

A Story of Big Business—And a Wonder Plant.

Every once in awhile we hear folks exclaim, "If George Washington were here, wouldn't he drop over if he saw that?" etc., etc., or "What would Grandpa say if he were living now?" Ever noticed it?

And it's all because George Washington



"Sure It Can Be Done," Said President Engelhart, and Then It Was Done.

and Grandpa lived in the—we might say—crude ages, when Progress was just starting to rub its eyes and wake up and the Cradle of Machinery had hardly begun to rock.

As we were going to say, if Grandpa were here today, or George Washington either, for that matter, and we took them out to 4201 Wrightwood avenue, Chicago, we'll wager they would wax more than enthusiastic.

For there—the embodiment of everything that is up-to-the-minute in the way of a real plant—is the establishment of the Chicago Solder Co. spreading its broad wings over an area of 50 feet by 250 feet. It is a two-story and basement structure, in the midst of the green lawns and shrubberies of a fine residential district.

How the plant grew out of the rather modest establishment that Grandpa knew, down at 218 Union avenue, and grew into the great new fireproof plant is a fascinating story of big business. It goes this way:

Some years ago the idea was conceived of marketing a self-fluxing wire solder. When the product was presented to the trade, folks just "ate it up," you know. And the business grew so rapidly that the

factory was unable to fill the onslaught of orders.

It was then that the manufacturers realized the necessity of developing a plant which would be sufficient in capacity and facilities to care for not only its immediate business, but the vast growth which these enterprising men saw was sure to come

So—the walls of warm-tone face brick rose up February, 1920, and in July of that year the 17,500 square feet of floor space was ready to receive the equipment and the supplies of the Chicago Solder Co.

Through a simple yet impressive entrance on the north one is introduced to the perfect embodiment of efficiency in the nth degree—a wonder plant. And it is more than that. More than a light plant—more than a daylight plant—it is a sunlight plant. Through its broad windows on the sides and through the great scissors-truss roof windows of the factory a veritable flood of sun and light pours in until every corner that would be dark, and every nook that would be in the shadow, are sunshine spots. And all the fumes are taken off through the roof windows.

In the extreme western end of the great workroom, shown in the accompanying illustration, is a machine shop wherein are made all of the machinery and tools for use in the factory. A. F. Sternad, factory superintendent, has personally designed a great deal of the machinery which has been installed and which is now being so successfully used.

Labor-saving devices of the newest types, equipment of latest design, individual motor-driven machines, have been employed to make the factory production not only

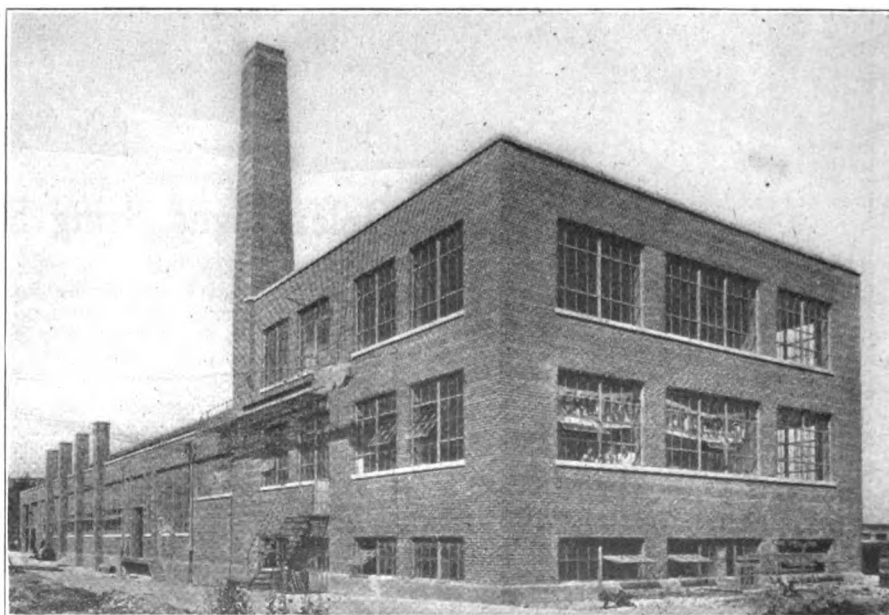
great but rapid. As an example of the care with which every detail has been worked out is the depressed concrete driveway adjoining the factory on the south, as shown in the accompanying illustration. Here it is possible for trucks and wagons to conveniently and quickly load and unload as the depression in the driveway brings their



Sales Manager Shaw is Careful in Making Promises, But He More Than Fulfills Them.

platforms to the corresponding level of the loading platform.

At this same loading door is an iced water cooler for the convenience of expressmen and deliverymen in order that



The Plant of the Chicago Solder Co. Is More Than a Daylight Plant—It's a Sunlight Plant With the Best of Ventilation.

GRAFF-O-OIL



Call the Spring Nurse

Stops Spring Squeaks

Graff-O-Oil is a liquid graphite—by a secret process the graphite is held in constant suspension. It instantly penetrates every part of the spring without spreading the leaves. The

liquid carrier then vanishes and a coating of graphite is deposited between each leaf. This gives perfect lubrication that preserves the spring and affords noiseless, easy riding.

Removes Rust

Apply Graff-O-Oil to rust on metal anywhere and the rust will instantly dissolve—the metal will not be injured. It will quickly loosen the rustiest nuts on bolts. It saves time and temper and is a true economy. Graff-O-Oil has capillary action and will travel upward and thus reach places otherwise inaccessible.

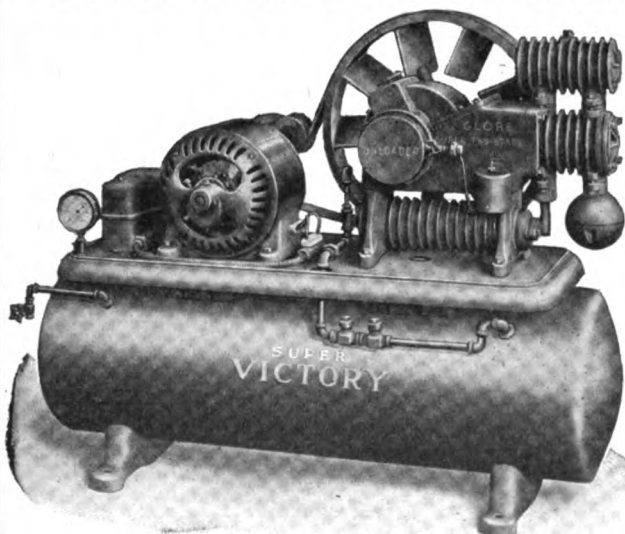
It is indispensable to the Autoist, Garageman, the Shop—to use anywhere that rust collects. In the home it stops squeaks in hinges, locks, etc. In full pint can with special nozzle—\$1.00.

Send \$1.00 for sample can today. Liberal discounts to jobbers and dealers—write for full information.

THE GRAFF-O PRODUCTS CO.

1071 Parkwood Drive, Cleveland, O.

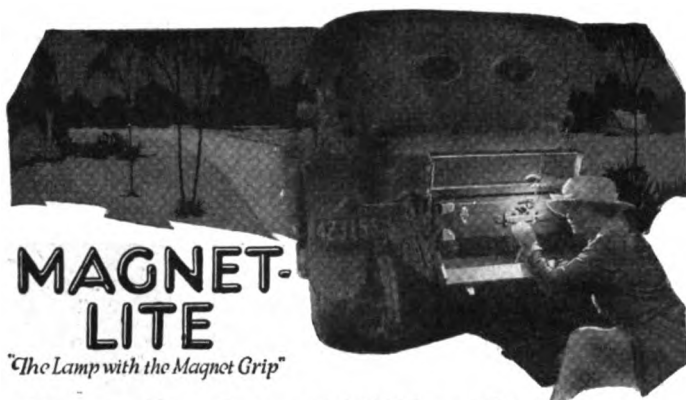
SUPER TWO-STAGE MOTOR-DRIVE COMPRESSOR UNIT



A NEW TYPE COMPRESSOR designed especially to handle Giant Pneumatic Tire Service and all other heavy-duty requirements up to 350 pounds.

Bulletin describing complete line of sizes and equipments on request.

GLOBE MANUFACTURING CO.
BATTLE CREEK, MICHIGAN

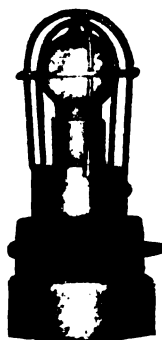


MAGNET-LITE

"The Lamp with the Magnet Grip"

Every Car Owner Will Want This Lamp

MAGNET-LITE supplies the demand for a trouble light instantly available for any repair operation and one which requires no holding. The powerful electromagnet base makes the light stick to any metal part of the car—no holding and no shadows—the illumination is directly where it is needed. The size of the lamp makes it available anywhere about the car. Its uses are numberless.



"Just what I've always wanted," is the universal expression of motorists when they see Magnet-Lite. Its remarkable convenience appeals at once to the man who has experienced night repair difficulties. Every time you show the light and explain the extremely simple operation, it means a sale.

Dealers will find every car owner in their territory an interested prospect. No accessory placed on the market has proved so popular and so necessary. It is a bonanza for the dealer in motoring accessories.

Some excellent distributor territory available. Communicate at once with the manufacturers and enclose coupon and \$5.00 for sample light.



The perfect light for the garage repair car.

Magnet-Lite retails for the small sum of \$5.00 but there is a handsome margin of profit for the dealer and distributor. Furnished in strong japanned container, 144-inch cord and dash plug connection.

Made Solely by

THE MAGNET LIGHT COMPANY

General Offices: 1509 South Michigan Ave.

Factory: 1576 South Wabash Ave.

CHICAGO, U. S. A.

THE MAGNET LIGHT CO.,
1509 S. Michigan Ave.,
Chicago, U. S. A.

☐ Currency
☐ Check
☐ P. O. Money Order
☐ Express Order

Gentlemen: Please send me full particulars regarding Magnet-Lite territory and sales helps. Enclosed find \$5.00 for sample light, complete, charges prepaid.

Please indicate:

☐ Single Contact
☐ Double Contact
☐ 6-8 Volt Storage Battery
☐ 12-16 Volt Storage Battery

Name
Concern
Street
City State

Territory Served

they may not disturb the men at work inside.

To make working conditions of the employes most comfortable seems to have been one of the big ideas in the minds of the owners of the plant. Not only has a first-aid hospital room been provided, but there are shower baths, and every individual has a roomy metal locker for his belongings. And not only that—at the noon hour employes obtain a home-cooked meal of palatable and tasty food at a cost price, which is usually about 35 cents a person. The majority of the employes of the Chicago Solder Co. have been associated with the business for years. They like it. And who wouldn't, of course.

On the top floor is a research laboratory, complete in every detail with electrical testing device and efficiency equipment for making the most thorough tests of soldering products, and soldering combinations. Great storerooms for the supplies are provided and on the first floor is a double fire and burglar-proof vault where lead and tin are kept in carload lots.

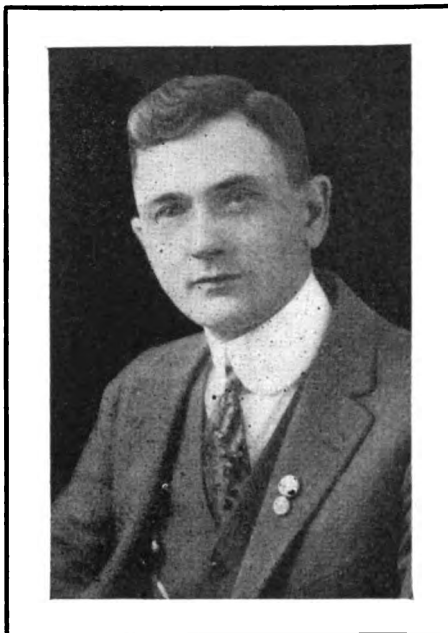
Just as harmonious, attractive and convenient as the factory arrangement is the office which occupies a space 50 feet by 50 feet. Adjacent to it will be found a restroom for the young ladies of the office—wicker furnished, colorful and comfortable. In fact, everything is "just right" and has been selected with the object of providing utility as well as neatness.

Now you've probably been wondering, if you have not already made their acquaintance, about "the products" of the Chicago Solder Co.—the nucleus about which this "wonder plant" grew.

Kester acid and rosin-core wire solder is known as the magic wand of soldering. It is a hollow wire filled with a soldering flux in a series of cells or pockets. It is goodbye to the acid pot and the carrying of flux when this solder is used, the manufacturers claim. The core is the solder-

ing flux which feeds with the solder—without waste to either.

For radiator leaks, speedometer flexible shafts, spark-plugs terminals, carbureter connections, battery terminals, pipe joints—garage work in general—for telephone



Superintendent Sternad Has An Unusual Capacity for Carrying Details in His Mind.

work in the operating room, back of the switchboard, in the terminal room, and in hundreds of other instances, Kester core solder is guaranteed by the Chicago Solder Co. to insure a perfect bond.

And we haven't said all of the good things about the company's product yet, but we must be moving along.

Frank C. Engelhart, president and treasurer, is the power behind the throne of the "wonder plant." It is due to his untiring efforts and executive ability that he has been able to design and erect a fac-

tory which is a credit to his experience and to the products manufactured.

He is well known to the canning trade as the Chicago Solder Co. makes canning machinery, and he is now vice-president of the Canning Machinery & Supplies Association.

Directly associated with Mr. Engelhart, in charge of sales, is James C. Shaw, who has had 15 years' experience in the selling and advertising game, being active as a manufacturers' representative most of this time. He was also district manager for the Goheen Mfg. Co., of Canton, Ohio, and introduced in five states the Presto-Felt window cleaner.

And so we bring to a close this little story of the Chicago Solder Co. and its great plant, which, it can be said, is the consummation and existing embodiment of the dreams of big things of grandfather's day.

Post and Whitney Tractor Companies Consolidate.

On January 31, 1921, the Post Tractor Co., of Cleveland, Ohio, and the Whitney Tractor Co., of Upper Sandusky, Ohio, were consolidated and the new company was named the Post-Whitney Co., of Cleveland, Ohio.

This company is capitalized at \$10,000,000, and the personnel of its officers is as follows: E. B. Cassatt, Cleveland, Ohio, president; A. B. Whitney, Upper Sandusky, Ohio, vice-president; C. B. Post, New London, Ohio, vice-president; A. J. Tuscany, Cleveland, Ohio, treasurer; F. R. LePage, Cleveland, Ohio, secretary.

The general sales and distribution manager is C. E. Grove and the general sales and service offices with the retail sales department are located at 2731 Prospect Ave., Cleveland, Ohio.

F. R. LePage, the chief engineer, has his office at the Post factory, East 93rd and Richmond Ave., and A. J. Tuscany, purchasing agent, has his office at the general offices of the company at 815 Society for Savings Building, Cleveland, Ohio.

The Post-Whitney Co. will maintain the plant at Cleveland, Ohio, where the Post tractor will be manufactured; also the Whitney plant at Upper Sandusky where the Whitney tractor is being built. This company will soon make an announcement of the purchase of a motor plant wherein will be operated its motors and transmissions.

The Whitney tractor has been built for a number of years and is a two-cylinder, four-wheel tractor of the two-plow size.

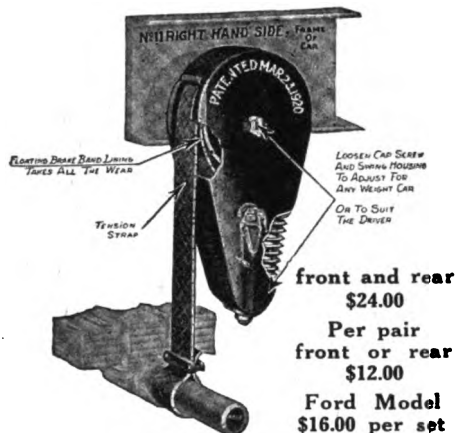
The Post tractor has been in the process of development for a number of years, and is an advanced step in tractor building, being both a front and rear drive and is of the three-plow size. The Post-Whitney Co. is rapidly getting into production and is putting on an intensive sales campaign—both domestic and foreign.



No Lines of Shafting in This Plant of Chicago Solder Co.—All Equipment Is of the Individual Motor-Driven Type.

Every Road a Boulevard

when a car is equipped with
"BULL DOG" BOUNCE ABSORBERS



FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. **NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE.** Easily attached; needs no oiling; has no metal parts that will wear or break.

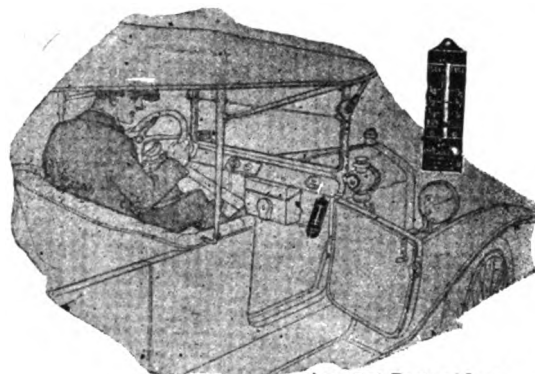
JOBBER! DEALER! Write for liberal discounts.

CHANNON-HUGHSON COMPANY
 225-231 West Erie Street CHICAGO, U. S. A.

FACE-TO-FACE VISIBLE GASOLINE GAUGE

For Ford Cars!

The only scientifically correct and accurate gauge on the market. Registers in plain view of driver on dashboard. One of the most remarkable conveniences ever devised for Ford cars. Sold with unconditional money back guarantee.



\$3.75 Postpaid or
 From Your Dealer

**No Wires—
 No Spirals—
 No Corks—
 No Air—
 No Impractical Devices**

**Agents—Dealers—
 Salesmen**

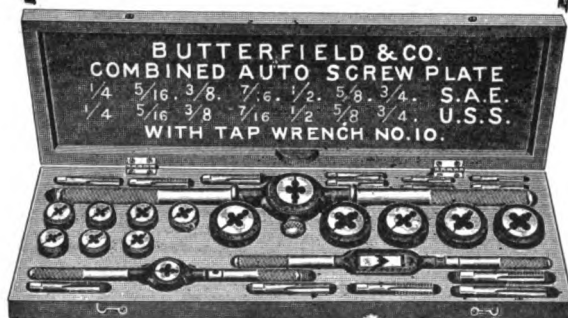
Write today for wholesale prices and exclusive territories. Nationally advertised. — Booklets and Circulars furnished.

Leitch-Nelson Co., 222 W. Congress, Detroit, Mich.

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



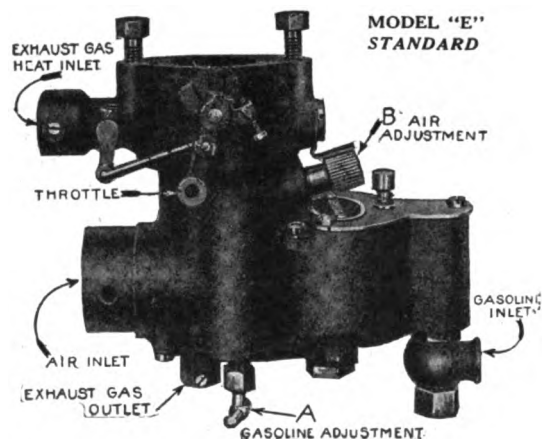
Set shown in illustration enjoys a well deserved popularity in the automotive field. Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each. Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street NEW YORK, N. Y.
 11 South Clinton St., Chicago, Ill.



MARVEL CARBURETERS

GIVE

Universal Satisfaction

POWERFUL—

ECONOMICAL—

SIMPLE—

Write for our new Catalogue

MARVEL CARBURETER CO.

FLINT, MICHIGAN, U. S. A.

Service by Air, or Service with a Capital "S."

A Willys-Overland service man in El Paso, Texas, recently gave a rather startling demonstration of service possibilities a few days ago when he used an airplane to give service to a motorist.

Early one morning a call was received from an owner 50 miles away who had smashed a wheel. To wait for the last afternoon train was not service as this dealer interpreted it. So he called an aviator on the telephone and engaged his services.

Getting into an automobile, the dealer hurried to the flying field carrying with him a new wheel. He found the plane in waiting and, climbing into the passenger's seat, was whisked away on the air jaunt. Just 41 minutes later he was at the scene of the accident, had replaced the smashed wheel and sent a happy owner on his way.

De Luxe Pistons by the Carload a Record-Breaking Order.

"The business is there, all right, for anyone who goes after it hard enough," says the Clark-Turner Piston Co., Los Angeles, Cal., and proceeds to prove the statement by presenting the fact that it has just

ness in the industry than many dealers and repairmen have believed to exist.

Hayes Wheel Co. Establishes an Indianapolis Branch.

Announcement is made by Chas. S. Slaker that the Hayes Wheel Co., Jackson, Mich., has established an assembly plant at Indianapolis, Ind. Mr. Slaker will be the general manager of the Indianapolis branch, which will be located at 2230 Alvord street. A complete repair department will also be operated to take care of all Hayes wheels which are for all makes of cars.

The new branch will take care of the territory comprising the states of Indiana, Ohio, Kentucky, Tennessee, Virginia, West Virginia and the southern part of Illinois.

Paragraphs.

THE STERLING TIRE CORP. and the EMPIRE RUBBER & TIRE CO., in co-operation with New York banking interests have caused the organization of the Rubber Corp. of America, which has taken over the entire sales and selling organization of the two manufacturing concerns.

There has been no change in the controlling interests of either, the object in form-

the Grease Pump Mfg. Co., and that the consolidated organization will hereafter be known as the H. G. Paro Co.

Customers are assured that it will be the aim of this organization to manufacture the very highest grade of grease pumps and other shop devices, and the new company hopes to receive the consistent and valued support given by its patrons in the past.

THE LEADER BATTERY EQUIPMENT CO., INC., St. Louis, Mo., has opened an office at 324 Title Guaranty Bldg. This company was recently incorporated under the laws of Missouri for \$10,000. Chas. A. Gutke is president, R. C. Gutke is secretary, and other offices are held by directors. The Leader Battery Equipment Co., Inc., is exclusive jobber and distributor of battery parts, equipment and general supplies.

THE WORCESTER ELECTRIC TOOL CO., Worcester, Mass., a newly-formed Massachusetts corporation, announces that it has taken over the business formerly conducted by the Stenman Electric Valve Grinder Co., Inc., the Stenman Electric Tool Co., and the Consolidated Machine Tool Co., all of Worcester, Mass. It is the intention of this newly-formed corporation to pursue a more aggressive policy in the portable electric tool field than did its predecessors.

The principal products featured for the present will be the HusKee 3 in 1 Combination Service Tool and the HusKee Service Drills. These tools have been put on the market in a small way during the past six months, and are the result of over two years' development work. They are strictly original in design and type and the construction is of the highest possible, both in material and machine work.

THE MILLERS FALLS CO., Millers Falls, Mass., has purchased the plant of the West Haven Mfg. Co., at West Haven, Conn., which for 25 years has been engaged in the manufacture of Universal and other brands of hack saws, band saws and small tools. Not only will the Millers Falls Co. continue the manufacture of Universal saws, but will make, at its West Haven plant, hand and power hack saws under the "Millers Falls" brand.



"The Business Is There"—Here's a Whole Carload of De Luxe Pistons.


shipped a full carload of the De Luxe pistons. Think of it! A full carload, and this not to a manufacturer but to a distributor to be sold to replace original equipment.

More than that, this record-breaking order has come to a company which is less than two years old. A better indication of the worth of the product and the progressive spirit of the company producing it could hardly be asked. This would seem to indicate, also, a much better condition of busi-

ness in the industry than many dealers and repairmen have believed to exist.

THE H. G. PARO CO., 1412-14 S. Michigan Ave., Chicago, announces that it has purchased the entire stock and patents of

CLEAN YOUR ENGINE REGULARLY WITH A



WAGNER AUTO ENGINE CLEANER

One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessity for repair shops.

Wagner Specialty Co., 1902 Broadway, New York City



Easy Riding

Guaranteed

HARVEY SPRING & FORGING CO.

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KENNEDY

Auto Storage Covers

furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

Made only by

THE KENNEDY CAR LINER & BAG CO., Shelbyville, Ind.

Canadian Branch Factory at Woodstock, Ont.

GREB AUTOMATIC GRIP PULLER

BEACH PATENT



It looks "hard to get at" but the Greb Puller finds a way

A Greb always will. It's this versatility—ready ability to grip and pull in the almost impossible places—that makes Greb Automatic Grip Pullers so handy for shop equipment. The wire wheel hub which this Greb is forcing off, as shown in the illustration, was stubborn in yielding to any other pressure. And it didn't afford any too much room for leverage. But the Greb, with instantly adjustable jaws, takes hold and hangs on until a few turns of the wrench have taken all the "fight" out of Mr. Hub.

*Just three Greb sizes to handle all classes of work. Each puller comes to you with a full set of long and short jaws—really four pullers in one.

Send for information on our garage tools and equipment and our 10-day trial offer—ASK YOUR JOBBER

THE GREB COMPANY

194 State Street BOSTON 9, MASS.

We also manufacture the Greb Rim Tool for cross split rims (Price \$7.50) and the Greb Extractor No. E-10 for Hyatt Roller Bearing Sleeves (Price \$4.00)

V-Plex Piston Rings

Give new life to old engines

by fitting them with the piston rings that **always** keep the gas-tight seal intact and also keep down gas, oil and repair bills.

V-PLEX Rings have six pressure points, evenly distributed around the cylinder wall.

Note in the diagram how the wedge-shaped center ring of the V-PLEX automatically forces the two outer pressure rings firmly against the walls of the groove.

Sell the ring that every user is boosting. Our sales plan gives dealers exceptional co-operation and liberal profits. Write to us at once.



Krasberg Piston Ring Co.
536 Lake Shore Drive, Chicago, Ill.

Cut It Out, Brother, Cut It Out

Away with delay, the trouble and expense of repairing scored cylinders, cracked water jackets, aluminum cases, covers, and other aluminum and iron castings by old time methods. Old fashioned, expensive and unnecessary operations must give way to direct action.

F. A. A. CAST IRON AND ALUMINUM MENDS
Go Straight to the Job



No Welding, No Re-Grinding, No New Pistons, No Warping or Cracking, No Waiting. Saves Dollars on Each Repair.

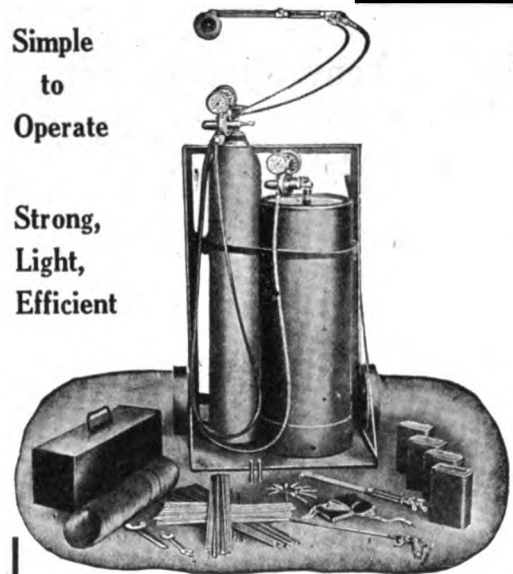
Send for Trial Order and Directions.

F. A. ALBERTUS AND CO.
206 9th St. MILWAUKEE, WIS.

Simple to Operate

Strong, Light, Efficient

Turning the Junk Pile Into New Money



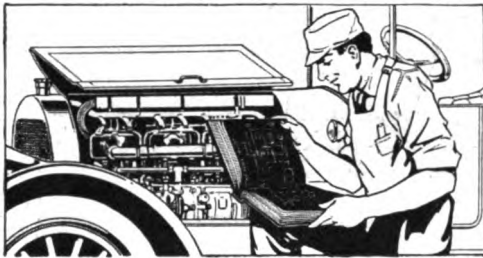
Type "B" Dyer Welding, Cutting and Carton Removing Outfit

25,000 Garage Men Use DYER Oxy-Acetylene Apparatus

You don't have to be an expert to repair frames, broken parts and radiators with the Dyer "B". It is the most advanced development in "fire tools" and saves many good cars from the scrap heap.

See your jobber or write to us for information

The Dyer Company, Cambridge, Mass.



Is A Wiring Job A Guessing Contest?

NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and stragglers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

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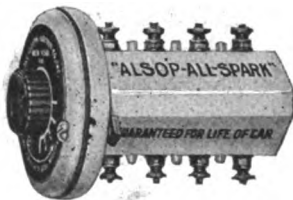


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It is the only device that will properly remove the valve from assembly from the Buick motor. It is quick, sure and safe, obviating the danger of bending washers, valve stems and valve springs, or breaking the valve cage. The getting of any of these parts thus broken may lay up your car for days and weeks. Fits Buick motors of all sizes since 1912. Strongly built of the best materials, yet is light and compact.

Every Garage and Repair Shop

should have a BUFFUM BUICK VALVE REMOVER as part of its regular equipment.

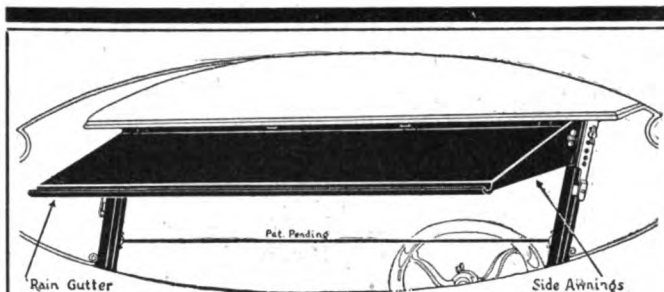
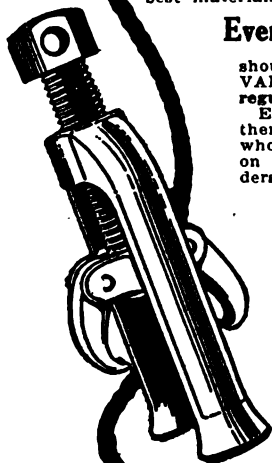
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They will unless you keep the proper amount of air in them.

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THE SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

will always tell you when your tires have the air pressure prescribed by the Tire Maker.

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VULCAN
The Replacement Spring
Our metal nameplate is on every genuine VULCAN spring for your protection.
If your jobber cannot supply you, write us—today.
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Put on VULCAN VIZOR

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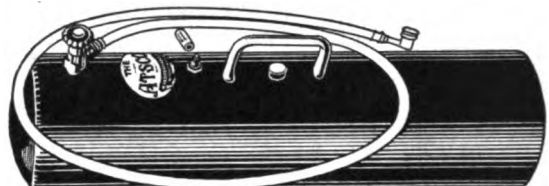
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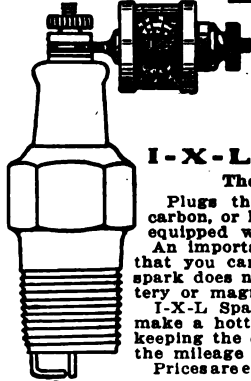
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Prices are extremely moderate. Dealer profits are liberal.
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installed in your garage will double your profits and give you a reputation for *quick, accurate* repairing.
The Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

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Tire Pumps

Now, when sales in most lines are hard to get, Rose Pumps are selling well. Motorists know they are getting an article of proven merit when they buy a Rose Pump. Its "patent Valve" has made tire pumping easy for them, and has made the Rose Tire Pump the dealer's best seller. Every dealer and jobber should handle Rose Pumps.

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GEAR AND WHEEL PULLER

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Transmission or
Differential in Two
or Three Minutes.
See! It's a one-man
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O'BRIEN
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Heavy Duty Grease Pump

Portable, compact—provides the satisfactory method of handling heavy transmission greases or oils, without waste, and grease is a profitable line for the dealer if he is equipped to handle it properly. An O'Brien will fill the average differential or transmission as quickly as the supply of gasoline and cylinder oil can be replenished.

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Fosnacht Valve Reseater
The advantages of a Fosnacht lie in its precision of adjustment to the job. Aligns and cuts valves and valve seats perfectly in one-fourth the time required by hand, without taking down the motor. It is mechanically impossible to cut a valve inaccurately, because of the automatic screw feed. The Fosnacht is widely known as "the garage man's friend"—it saves money and valuable time—makes profits and satisfaction sure. List price \$30.00.

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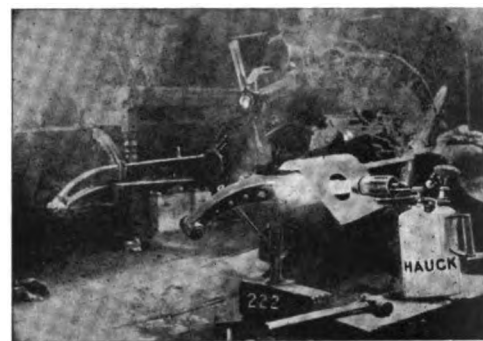
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A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

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Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

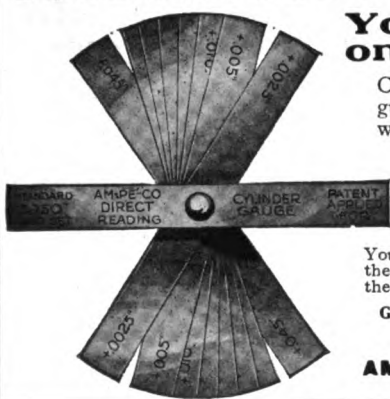
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You Don't Guess the Answer

**You READ It
on the Blade**

Cylinder measurements
guaranteed accurate to
within .00025" and less.



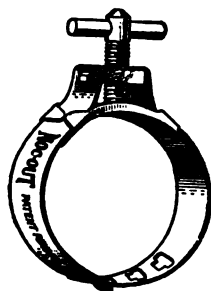
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Direct Reading
Cylinder Gauge**

You simply find the blade that fits
the cylinder and *instantly* read
the correct measurement.

Get the whole story in our circular.
PRICE \$2.50

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New		Tube
30x3	\$7.75	\$1.50
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31x4	13.00	2.00
32x4	14.00	2.10
32x4	15.00	2.20
34x4	15.25	2.30
32x4 1/2	20.00	2.30
33x4 1/2	20.50	2.40
34x4 1/2	18.50	2.50
35x4 1/2	19.50	2.60
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Mail orders, \$3 deposit with each tire ordered, balance C. O. D., subject to your inspection. A trial order will convince you.

5% off for cash with order.

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Some of our agents cleared above \$10,000 last year. Best territory open. Very liberal contracts. Popular policies. The Farmers National Life has \$1.75 of admitted assets for each dollar of policy liability. Write at once to

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We are the biggest wreckers in the world. The size of our business enables us to undersell all competition.

Money cheerfully refunded if you are not satisfied.

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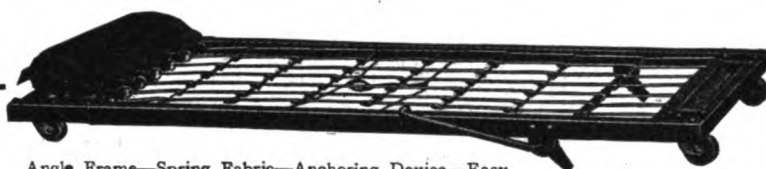
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New Era Spring and Specialty Co., Grand Rapids, Mich.
R. T. Mfg. & Sales Co., 3847 W. Madison St., Chicago.

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Am-pé-co Sales Co., Marshalltown, Iowa.

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H. G. Pare Co., 1410 So. Michigan Ave., Chicago.
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Romort Mfg. Co., Oakfield, Wis.
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Butler Mfg. Co., Indianapolis, Ind.
Ever-Tyte Piston Ring Co., St. Louis, Mo.
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Loudon, Inc., 107 Western Ave., Minneapolis.

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All-Spring Shock Absorber Mfg. Co., 202 S. 7th St., Minneapolis, Minn.
Channon-Hughson Co., 229-233 W. Erie St., Chicago.
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W. J. Smith Co., 1834 Broadway, New York.

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M. W. Dunton Co., The, Providence, R. I.

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M. W. Dunton Co., The, Providence, R. I.

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Leich Electric Co., Genoa, Ill.

W. H. S. Mfg. Co., Indianapolis, Ind.

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Brewer Specialty Corp., 2453 S. Wabash Ave., Chicago.

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All-Spark Ignition Co., 13 Water St., New York.

Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago.

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Harvey Spring & Forging Co., Racine, Wis.

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C. A. Shaler Co., Waupun, Wis.

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A. Schrader's Son, Inc., 783-793 Atlantic Ave., Brooklyn, N. Y.

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A. Schrader's Son, Inc., Brooklyn, N. Y.

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WRENCHES

The Graham Roller Bearing Co., Coudersport, Pa.

Index to Advertisements

A		I	
Accurate System & Manifold- ing Co., Inc.....	—	Indiana Parts Co.....	59
Air-Tight Steel Tank Co.....	56	J	
Albertus & Co., F. A.....	53	Jenkins Vulcan Springs Co...	56
All-Spark Ignition Co.....	54	K	
All-Spring Shock Absorber Mfg. Co.....	61	Kastens, Henry.....	—
American Bolt & Screw Case Co.....	—	Kennedy Car Liner & Bag Co.	52
American Valve Tool Mfg. Co.	—	Krasberg Piston Ring Co.....	53
Am-pe-co Sales Co.....	57	L	
Atlas Auto Supply Co.....	—	Laminated Shim Co.....	54
Auto Specialties Mfg. Co.....	5	Leich Electric Co.....	4
Automotive Publ. Co.....	54	Leitch-Nelson Co.....	51
B		Lewis & Milligan.....	61
Bailey Co., Geo. D.....	—	Loudon, Inc.....	—
Boddy, J. Newton.....	55	M	
Brewer Specialty Corp.....	—	McDaniel Rubber Co., Leo....	—
Brunner Mfg. Co.....	62	Magnet Light Co., The.....	49
Buffum Tool Co.....	55	Marvel Carburetor Co.....	51
Burd High Compression Ring Co.....	37	Marvel Machinery Co.....	—
Burgess-Norton Mfg. Co.....	58	Motor Salvage Co.....	58
Burroughs Adding Machine Co.....	—	N	
Butler Mfg. Co.....	59	National Cash Register Co....	45
Butterfield & Co.....	51	National Refining Co.....	43
C		National Rubber Filler Co....	—
Catelain, Andre G.....	59	New Era Spring & Specialty Co.....	55
Challenge Battery Co.....	57	P	
Champion Pneumatic Machin- ery Co.....	6	Paro, H. G., Co.....	57
Channon-Hughson Co.....	51	Peerless Engineering Co.....	—
Chicago Solder Co.....	39	Pennypacker Co., The.....	—
Clark Co., W. L.....	—	Premier Electric Co.....	56
Commercial Mfg. Co.....	7	R	
Curran-Detroit Radiator Co.	—	Reynolds Spring Co.....	56
Curtis Pneumatic Machinery Co.....	39	Romort Mfg. Co.....	3
D		Rose Mfg. Co., Frank.....	56
Dearborn Equipment & Hinck- ley-Meyers Co.....	—	R. T. Mfg. & Sales Co.....	57
Dickerson, C. A.....	54	Rust Products Co.....	5
Duntley, J. W.....	—	S	
Dunton Co., The M. W.....	—	Shaler Co., C. A.....	Front Cover
..... Back Cover	—	St. Paul Welding & Mfg. Co.	—
Dyer Co., The.....	53	Sampson Electric Co.....	59
E		Sawyer-Weber Tool Mfg. Co.	—
Eclipse Valve Grinder Co....	—	Schrader's Son, Inc., A.....	55
Ever-Tyte Piston Ring Co....	—	Slipon Co., The.....	—
..... Inside Back Cover	—	Smith Co., The W. J.....	57
F		States Chemical Co.....	8
Fairbanks Co.....	—	Stiles Mfg. Co.....	—
Farmers' National Life Insur- ance Co.....	58	Storm Mfg. Co.....	56
Federal Electric Co.....	41	Sunderland Machinery & Sup- ply Co.....	—
Flinck & Co., W. M.....	—	T	
Flexlume Sign Co.....	47	Tokheim Oil Tank & Pump Co.	—
Foster Bros. Mfg. Co.....	59	Trindl Co., The.....	59
G		Tungsten Mfg. Co.....	—
Ganschow Co., William.....	54	U	
Garden City Spring Works...	59	U. S. Air Compressor Co.....	—
Gem Novelty Co.....	—	Universal Mfg. & Sales Co...	56
General Accessories Corp.....	47	V	
Globe Mfg. Co.....	49	Van Trump-Eselbey Co.....	—
Graft-O Products Co.....	49	Victory Oil Stove Co.....	—
Graham Roller Bearing Co., The.....	—	W	
Greb Co.....	53	Wagner Specialty Co.....	52
Green Engineering Co.....	58	Warsawsky & Co.....	58
Greenfield Tap & Die Corp....	—	Washburn Burner Corp.....	—
Greer College of Motoring....	58	Webber Co., P. H.....	6
H		Western Rubber Mold Co.....	—
Harvey Spring & Forging Co.	52	W. H. S. Mfg. Co.....	61
Hauck Mfg. Co.....	57	Worcester Abrasive Co.....	—
Heiser Special Tool Co.....	— Inside Front Cover	—
Hicken Sod-Tor-Lite Co., B. E.	59	Z	
Hobart Bros. Co.....	—	Zinke Co.....	3 and 56

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SATISFACTION OR MONEY REFUNDED

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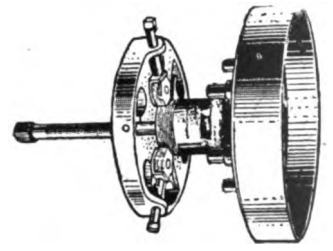
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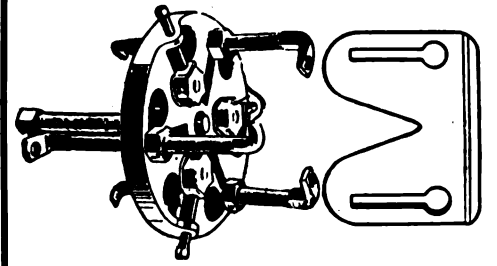


Strength and wide range of adjustment make this tool superior for gear pulling and arbor press work. Malleable plate for press shown at right of complete tool below. Note material used; heat treated nickel steel arms; hexagon blocks and large power screw are hardened malleable castings.

Each of the six sides of hexagon blocks shown above has different size thread for engaging any hub thread. Adjustable to hubs of various diameters. Any mechanic knows the advantage of pulling direct on hub instead of the old awkward method of hitching to spokes.

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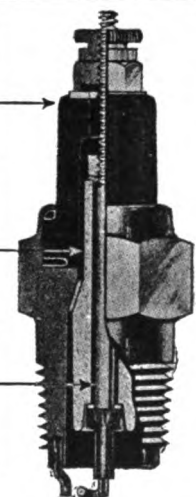


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Knowledge gained from the Handbook will make you a better compressor buyer, or seller. Every page is rich in pneumatic engineering facts — fads and advertised fallacies exposed.

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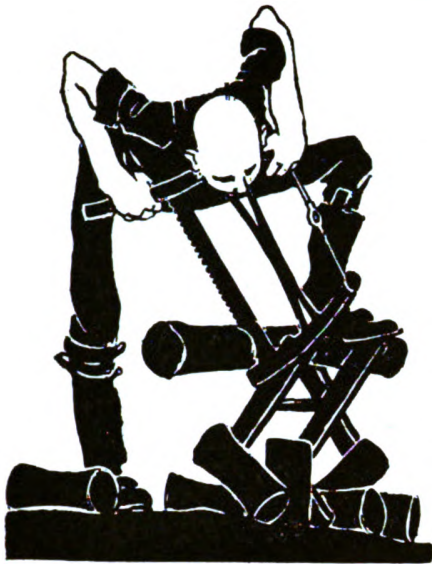
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Now is the time to saw-wood

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ZELNICKER Ever-Tyte The Piston Ring for All Engines

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COVINGTON, TENN.

FORD CARS, TRUCKS
AND BUSES

Nov. 24, 1920.

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In our city, there is a Ford that will out-run any other car, regardless of make, and it is equipped with Ever-Tytes.

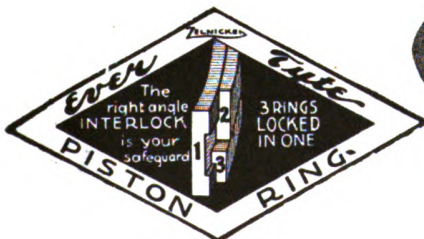
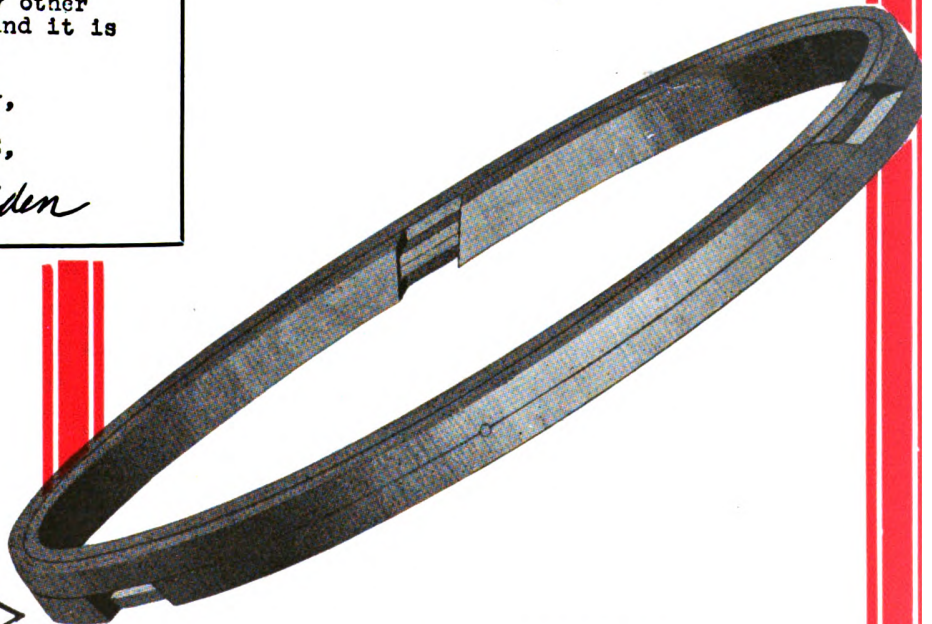
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SHELTON'S GARAGE,

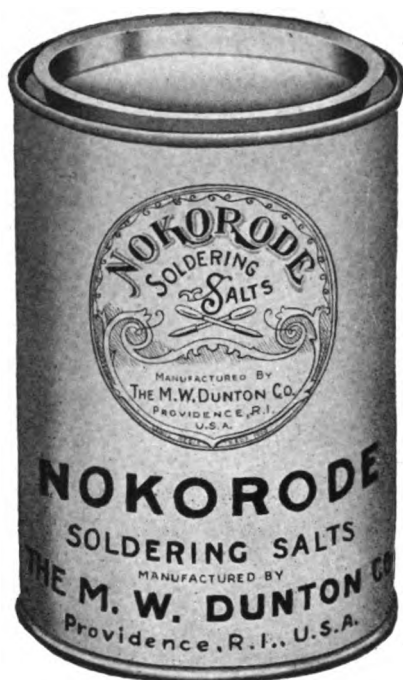
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670 Eddy Street

Providence. R. I. U. S. A.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

AUGUST, 1921

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The ORIGINAL Quick Seating Ring

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Burd Piston Ring Directory Mailed FREE

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List Prices (Subject to Trade Discounts)

All diameters to 4 inches, inclusive - 60c each
All diameters over 4 inches to 5 inches inclusive - 70c each

Sold by All Jobbers—Everywhere

BURD HIGH COMPRESSION RING COMPANY, Rockford, Illinois, U. S. A.

Sales Offices in the Following Cities:

Atlanta Baltimore Boston Chicago Philadelphia New York Kansas City Des Moines San Francisco Dallas Seattle Winnipeg
Buffalo Cincinnati Detroit St. Louis Indianapolis Cleveland Minneapolis San Antonio Los Angeles

ARE YOU WAITING *for* BUSINESS?



Waiting for business this summer is like waiting for rain in a drought.

Big business and fat profits are going to the garage man who adopts "Go get 'em methods," advertises his business and renders first class service with up-to-date equipment.

The waiters and wishers won't get it.

ROMORT

A AIR AND WATER STATION

installed in front of your place of business will bring you hundreds of new customers that would otherwise drive by. It puts your business out in front and gets the attention of the approaching motorist a block or two away. Once he uses Romort Service he gets the habit of stopping at your garage and soon becomes a regular customer for the things you sell.

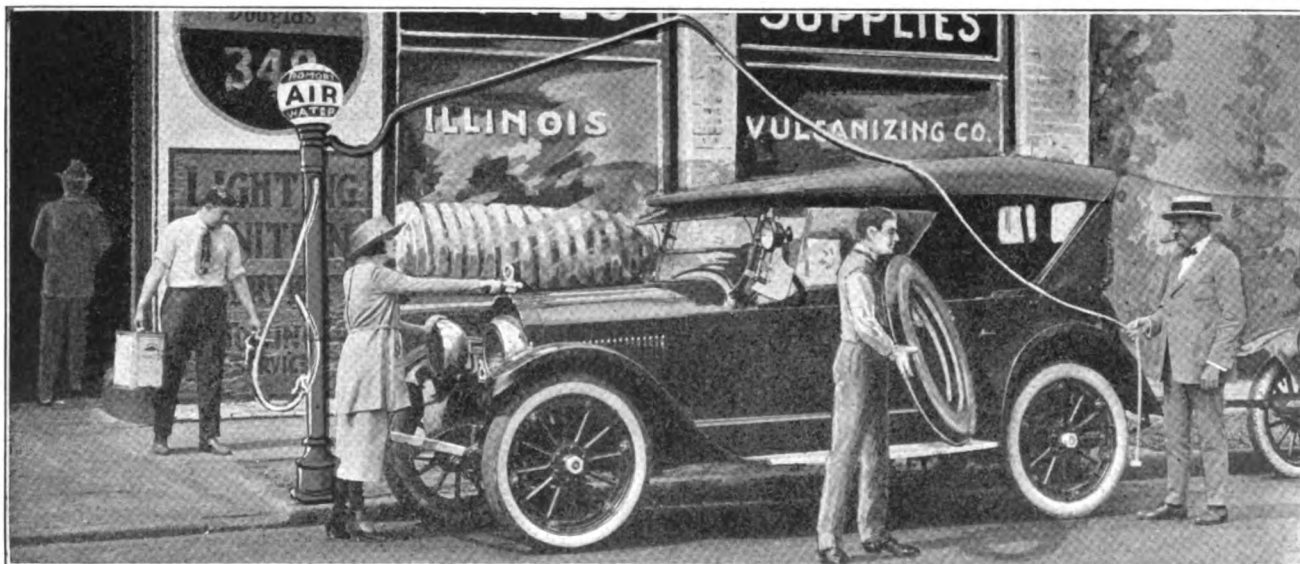
Car owners appreciate the cleanliness and efficiency of Romort Service. The "ever clean" air hose that never touches the ground—the way it reaches all four tires without moving the car—the automatic governor that returns the hose to an upright position after using and eliminates the necessity of putting it away—and the convenient grip valve water hose for radiator use.

Built in five styles, including models for outside wall installation and interior ceiling installation.

Your name on a postal addressed to our Sales Dept. will bring full details by return mail.

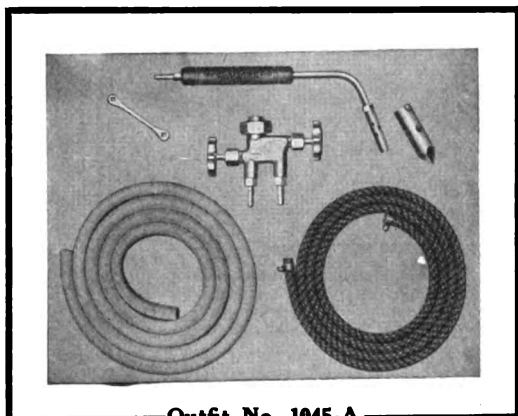
Manufactured by
ROMORT MFG. CO.
Oakfield, Wis.

Sales Dept.
THE ZINKE COMPANY
1323 Michigan Avenue
Chicago, Illinois



WASHBURN

Soldering, Brazing, Lead Burning and WELDING



Outfit No. 1045-A

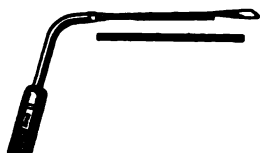
CAN YOU IMAGINE A TORCH that can easily be controlled from the finest flame required in the SOLDERING of a delicate piece of jewelry or ELECTRICAL INSTRUMENT to a flame sufficient for HEATING AN AUTOMOBILE FRAME for straightening, without changing the tip? This feature is found in the WASHBURN TORCH—NEEDLE POINT FLAME—Uses Prest-O-Lite Gas and Compressed Air. Easily attached to A, B, or E size Prest-O-Lite Tank. Small Air tank with foot pump can be used, garage air line, etc. Soldering Iron attachment can be heated to soldering temperature in 25 seconds. Uses 15 parts air to one part gas. Outfit No. 1045-A consists of—

- 1 Washburn Torch
- 1 Mixing Valve (Tank Attachment)
- 1 Soldering Iron Attachment
- 2 Six-foot Hose Lengths
- Hose connections
- 1 Prest-o-Lite Tank Key

Price Complete\$19.50

RADIATOR SOLDERING ATTACHMENTS

Order No. 1075-A



These attachments are great time savers in the repairing of radiators, giving the operator a combination open flame and soldering iron in repairing tubular and honey comb radiators.

Sold only for use with the Washburn Torch.

Price per set.....75c

WASHBURN OXY-ACETYLENE WELDING OUTFIT

- 1—18-Inch Welding Torch
- 7—Welding Tips
- 1—2-Inch Oxygen Regulator—50-lb. gauge
- 1—C Acetylene Regulator
- 22 ft. Hose

Price Complete\$45.00

Manufactured by

The Washburn Burner Corporation

General Offices and Works
Kokomo, Indiana, U. S. A.

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Faith, the Wonder Worker.....	9
That Proposed Federal Tax.....	9
Advertise Now	10
Trends of Transportation.....	10

GENERAL

Advertising Value—What Is It? by Felix Koch.....	11-12
Being a Character Has Money Value, by K. H. Lansing	13
Some Shop Notes for the Repairman, by F. H. Sweet	14
Law in Connection with Warranties, by Chesla C. Sherlock	17
Folks Never Do Like Titewad Dealer, by Frank Farrington	18-19
Penlings from the Pen of Dike.....	19
Legal Rulings of Interest to Garagemen, by R. R. Rossing	21
Trouble—How It May Be Detected, by J. N. Bagley.....	22-23-24
Safe Light—No Glare—Intent of Law, by Robert Livingstone	29
Glimpses in the Garageman's World.....	30-31

DEPARTMENTS

Accounting, by J. N. Boddy.....	15-16
Welding, Cutting and Brazing Practice, by David Baxter	26-27-28
Practical Hints for Shop Mechanics.....	32-33
Readers' Questions and Answers.....	34-35
Automatic System for Small Garages.....	36-37
Accessories—Dealers' Key to Profits.....	38-40-42
Here and There in the Motor World.....	44
Up-to-the-Minute Garage Equipment.....	46-48-50-52

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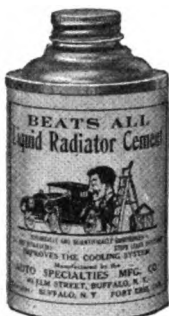
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Subscription per Annum (Postage Paid) \$1.00. Advertising Rates on Request.

Your Profit 100%



BEATS-ALL LIQUID RADIATOR CEMENT

Beats-All FOR **PROFIT
QUALITY
RELIABILITY
GUARANTEE**

FREE OFFER
Good Until September 1st, 1921

Order Today

Please send us **FREE OF CHARGE**

3	8 oz. cans Liquid Radiator Cement @ \$0.50.....	\$1.50
2	12 oz. cans Liquid Radiator Cement @ \$0.75.....	1.50
		\$3.00

In consideration of these free goods, send me

2 doz.	8 oz. BEATS-ALL Liquid Radiator Cement.....	12.00
1 doz.	12 oz. BEATS-ALL Liquid Radiator Cement.....	9.00

Including free goods the above re- tail for.....	\$24.00
Goods to cost us.....	12.00

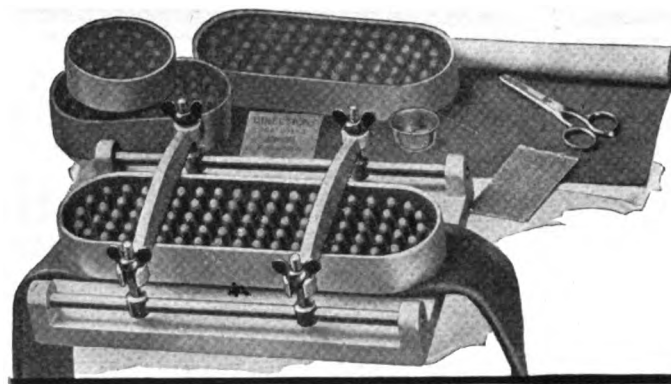
*Kindly Specify Jobber you want Goods
Shipped Thru.*

Seals Instantly and Permanently

"BEATS-ALL" Liquid Radiator Cement is a chemical compound that seals small leaks in water systems of automobiles, trucks, tractors, boilers, etc., and seals them instantly and permanently. **No Delay and loss of time and money.** "Beats-All" seeks the Leak and is positive in results. Use 2 oz. to each gal. of water Radiator contains.

"Beats-All" will not injure or corrode metal, nor will it in any way injure water connections or interfere with the circulation of water. Does not congeal in the radiator or water jackets. "Beats-All" will not repair or make a new radiator or water jacket that has large holes in them where the water flows out in large streams, but it repairs all small leaks promptly and efficiently.

Manufactured only by the
AUTO SPECIALTIES MFG. CO.
40 ELM STREET, BUFFALO, N. Y.
Factories: Buffalo, N. Y.; Fort Erie, Can.



Model "S" for Private Garages and Repair Shops

VULCANIZE

Your Tube Repairs

Mend any and all tube cuts, tears, blowouts and punctures the sure, quick and lasting way—by **vulcanizing** with this Adamson Model S.

Will cure patches up to 12 inches long; uses common gasoline, the handy and economical fuel. No steam, no electricity, no watching or waiting. Automatic, always ready for quick work. Just put in proper quantity of gasoline and ignite.

ADAMSON

Model "S" Vulcanizer

Complete with Half
Pound of Repair Gum **\$15**

Put one in your shop at once and make perfect repairs at lowest possible cost in time and money.

Takes practically no room; any helper can use it in odd moments.

Will pay for itself many times over, and enable you to turn out the

Best Tube Repairs

ADAMSON MANFG. CO.

East Palestine, Ohio

Makers of Complete Adamson Line of Portable Vulcanizers from \$1.00 to \$3.00. Also Storage Tanks. Also Brake Shoes and Oil Coolers for Fords

Champion Equipment gives the biggest measure of satisfaction for the money

To that end we have developed CHAMPION Air Compressors to their present position of pre-dominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

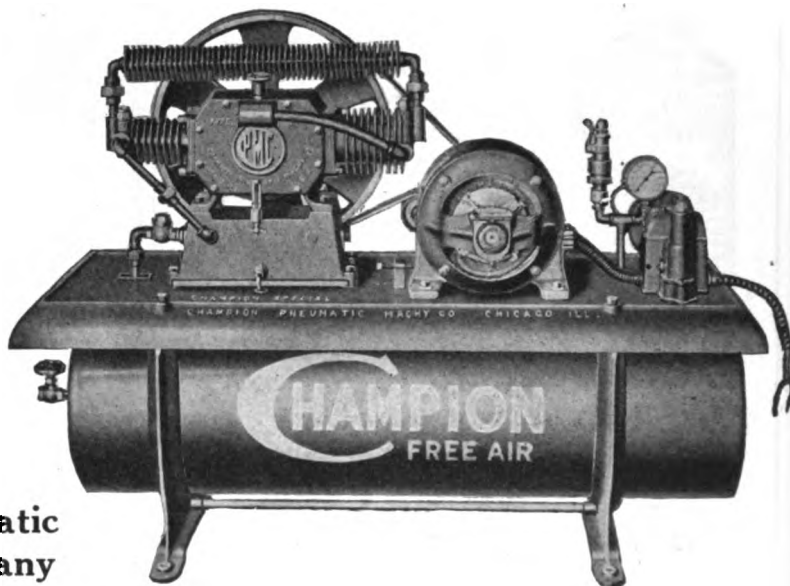
An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

Champion Pneumatic Machinery Company

1403 So. Michigan Ave.

Chicago, Illinois



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

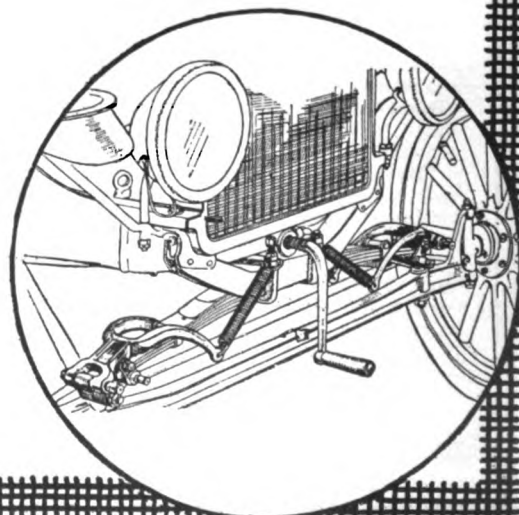
DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:

WALTER ECKHOUSE & CO., 616 S. Michigan Ave.

In Canada—RICHARD WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



FEDERAL ELECTRIC SIGN



How Do Automobilists Know Your Garage at Night?

It is easy enough for them to find you if you have a Federal Electric Sign—an inexpensive form of advertising that really brings results. You can't afford to be without one, for you are losing prospective customers who pass you by without seeing your garage and patronize one that has a Federal Electric Sign lighting up the front. It instantly tells the automobile owner that he can have his wants supplied, and accordingly he will go direct to the garage that advertises for his patronage.

Made of porcelain enameled steel—will not rot, rust or fade and will last indefinitely. Costs but a few cents a day for electricity.

Gain a step on your competitor. Make a bid for the patronage that passes you by when your garage is dark at night. Get a sparkling electric sign. Send coupon today for full details, prices and **free sketch** showing how your sign will look.



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information **price and free sketch of a Porcelain-enameled Steel Sign** for my business. Explain your **12-months-to-pay Plan**.

Name City..... State.....

Street and No..... Business

Store Frontage..... No. of Floors.....

AGAD-8

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.



Just Show the Carowner What he can do with SPEE-DEE

It will pay you to call the attention of all your customers to SPEE-DEE. It is not merely a matter of **making one sale** but of frequent re-sales, because the motorist who once uses SPEE-DEE will not be without it.

Every man who drives a car has to stop once in a while to make some repair or adjustment that leaves his hands soiled and greasy. Cold water, even if available, won't remove this kind of grime and gasoline means chapped or cracked hands. But with the use of SPEE-DEE the grease and grime roll off the hands, leaving them soft and marvelously clean.

SPEE-DEE cleans greasy, grimy hands with or without water

and without injury to the skin as it contains no grit, acid or lye.

Just explain this feature of SPEE-DEE to any carowner and he will readily buy a can. He will find it useful for so many purposes that he will be back—again and again—for more. He must have it.

The price is moderate, yet the dealer profit is liberal.

*Write today for full details
and dealer selling helps*



STATES CHEMICAL CO.
680 W. Austin Ave. Chicago

SPEE-DEE

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 8.

CHICAGO

AUGUST, 1921

Faith the Wonder Worker.

While midsummer is ordinarily very quiet in a business way, conditions are gradually shaping toward better business.

"Crops in this territory are good—that is, wheat was of good quality and of a good average volume. We have excellent prospects for corn and a little more rain will mature that," writes one of our readers located in the great Middle West. And since then the rain has matured the corn.

"Conditions like these cannot help but bring money into the country," he concludes, "and that will help our business."

During the latter part of July there were deliveries of unprecedented magnitude from the farms, which mean that the turning of grain holdings into cash is gradually solving the Western problem of "frozen credits."

In the South, where the similar problem is slower of solution, it is apparent that movement of cotton from plantation to market, purchase of cotton by home spinners, and outgo of cotton on export have been greatly in excess of last summer's movement. If the government's estimate of over 25 per cent decrease in planted acreage turns out to be correct, there is reason to expect that the unwieldy "carry over" from the old crop will not again be choked up by new production of the old-time size.

These developments, in addition to the fall in money rates, and the promising prospects for the relief of the railroads, are all auguries for the

improved business which is confidently expected by many business men throughout the country.

"The automotive industry," declared a prominent manufacturer recently, "is and will continue to be an essential factor in the development of our whole civilization. It has gone through its period of reconstruction; it has reorganized its policies and

PRODUCTION COSTS MUST BE REDUCED.

Fundamentally, we must get our production costs down. That lies only along the road of increased efficiency in our whole industrial machine. It means a willingness of our working people to put forth every effort that is in them consistent with health, proper family life, and good citizenship. The surest road to a continued high wage, and the surest safeguard against unemployment is to remove every restriction on effort. —Herbert Hoover.

methods to meet the new order of things, and is better prepared today for a running start than almost any other branch of industry.

"A liberal expansion of credit will hearten our business men and will create a new confidence. Confidence will bring back prosperity. Prosperity means an expansion of transportation facilities. The burden of transportation expansion will fall to the automobile. The automobile will meet the demand upon it."

All of this gets back to the matter of faith. Faith in yourself—faith in your business. Faith begets courage,

and courage gives the ability to go ahead despite everything. Cultivate Faith! It's a wonder worker.

That Proposed Federal Tax.

Congress just now is very much concerned with the tax question. Newspapers the past week have had much to say on the question—and it's a live one, too, for the federal revenues do not meet the proposed budget of expenses.

Only recently, Secretary of Treasury Mellon proposed a plan for placing an annual tax of \$10 upon motor vehicles. This announcement was received with satisfaction only by the people who do not own cars.

Owners believe they are taxed enough already. They pay to the federal government 5 per cent upon the cost of the car or truck. They pay the state a registry fee which varies in different states. Uniformity in state taxation does not obtain. In addition, in many states there is an operator's license fee, and often a local municipal fee of some kind.

Taxation on automobiles is a complicated matter. It would be simpler if they traveled only on the roads of one state—but many cars and trucks are interstate in their use.

The proposition to pay \$10 per year for a small runabout is certainly to be regarded as unfair by owners of such cars, if owners of finer cars pay no more. Also, should not a distinction be made between cars used for pleasure and those used in business? The business man undoubtedly would ob-

ject to paying the same amount of tax for the motor vehicle that he uses in making deliveries as does the person who uses a car for pleasure only.

Another matter of discrimination which might be urged is the case of the high-powered and heavy touring car or truck being placed on the same plane with the lighter vehicle which does comparatively little damage to the roads.

Congress is considering the taking off of taxes on little luxuries, that in the mass amount to a large sum. They are not seriously felt—a penny here, two pennies there, and so forth.

Undoubtedly Congress will be asked by the automobile owner why, if such taxes are to be dropped, should they be singled out to contribute an annual fixed sum to the federal revenue. And it must be remembered, also, that the farmers would file vigorous protests, for the farmer is a large user of motor vehicles.

Advertise Now!

"Careful survey of business houses proves that 99 per cent of those rated at \$100,000 or more are liberal advertisers. A careful checking of the stock in ten country stores proves that more than 90 per cent of the best sellers were nationally advertised.

"An investigation in homes shows positively that a majority of all furniture, clothing, food and personal property was introduced into the homes by advertising, even though each article was purchased from the local dealer."

These are statements of a man who stands high in the advertising field. Moreover, he declares that advertising is going to place the price of goods within the reach of all by this winter. Says he: "It will bring such a flood of customers that goods can be marked low—and small profit on one customer will amount to large figures on many customers."

One of the Chicago papers says that if the big crops in sight make good, the farmer is going to have plenty of money to buy all he needs—and he needs everything. It adds, however,

that many manufacturers and jobbers, who are not preparing for this business, will get "bumped," and "bumped hard."

One manufacturer who has been running since the first of the year on a 22-hour day basis was asked how he does it, and his reply was: "I am doing business on the basis of 1921

SUCCESS NOT ATTAINED BY BRILLIANCY OR LUCK.

Analyze the character of the men in the highest places. You will find they attained their positions by preparation—mental, moral, physical, technical; brains well trained, energy well directed, work well sustained. Are the qualities of success attainable by a man of ordinary natural abilities? Unquestionably, yes.

Here are a few of the essential qualities which will win against all the powers of so-called ill-luck:

1. Absolute, unswerving integrity.
2. Brains, mental grasp.
3. Energy and force of character.

4. Capacity for work, executive power, the ability to bring things to pass. This is the product of industry by system or method. It is the art of making every stroke count.

5. Personal manners, engaging address.—Archer Brown.

costs. I wiped the slate clean the first of the year and pocketed my loss. Now I am in the game right and doing a good, profitable business."

In the past year many business men and also some automotive dealers have never stopped to consider the hen.

Does a hen stop scratching when worms are scarce? When it is hungry, it keeps on scratching until the worms are found.

Advertise the fact that you are selling on the basis of today's cost. The successful merchandiser keeps his stock coming in at the rear in cases and going out at the front in packages. He does it by advertising and making his advertisement a daily and weekly matter of interest to the families of his community. He does not make a splurge now and then but he keeps his advertisements running—and keeps them interesting.

Yes, publicity does bring in business. It has been responsible for the success of many concerns and will be more so in the future.

Trends of Transportation.

"Jitney Rocks Break Another Traction Line," is the heading over a press dispatch from Bay City, Mich. Another day, we read under a Des Moines, Iowa, headline: "Busses were substituted here today for street cars as an effective transportation system.

"With car service scrapped at midnight, fully 30,000 persons—one-half of the city workers—were carried to work in busses. The rest rode in their own automobiles or were picked up by car owners. The busses carried 60,000 persons altogether, it is estimated."

In the newspaper advertising columns, we find notices such as "Move the Red Ball Way. No crating necessary; expert furniture movers take your household goods from your old home and deliver them direct to your new home in large furniture vans. We are National Movers," etc.

Trends of the times are these reports and advertisements. The motor vehicle is replacing the older forms of passenger transportation outside the large cities and freight transportation within a 500-mile hauling radius.

The Des Moines experiment with busses is interesting in that relief from traffic congestion in the downtown district was noticeable to pedestrians and automobilists. When street cars were operated, automobiles were forced to line up behind them and wait while they were loading and unloading. The busses pull into the curb to load, letting traffic continue.

Just what the ultimate will be in transportation in the medium-sized communities is impossible to predict, but it is evident to the observers that the day of the track and trolley transportation system is passing. That some form of motor vehicle will replace it is indeed probable judging from present trends.

Advertising Value—What Is It?

People Love to Investigate Trouble Decided This Cincinnati Man—And Proceeded to Utilize This Idea in Constructing a Unique, Eye-Arresting Service Wagon—Attributes Success to Pleased Customers and Good Advertising

By Felix J. Koch

In the twin cities of northern Kentucky—Covington and Newport—there is a proprietor of a high-grade garage who is acquiring just about all the business he and his rapidly-expanding repair force can attend to, largely because of the development of a very simple and almost elemental idea.

This man, who is the head of the Third Street Motor Car Co., stood at the curb one fine day not long ago, awaiting trade and bemoaning business conditions generally. A fire-engine came hurtling by in response to a call. Somewhere, obviously, there was a fire, which meant there was trouble for someone. Consequently there, as elsewhere, the civilized world over, everyone who could spare the time took an impromptu recess from other business and went in instant pursuit of the fire automobile.

Not far away the man could see the fire. A simple, intown residence had started to burn as a result of crossed wires within. Had the whole house been consumed, the fire would have been too commonplace to have received more than the barest mention in the public prints.

Nevertheless, people, in increasing numbers, continued to flock to the fire. People followed the hose-cart, ladder-wagon, and other fire-fighting apparatus, just as fast as they possibly dared.

Get the Idea—Then Advertise!

"Great oaks from little acorns grow"—so runs the familiar childish jingle, and so, also, the history of the industrial growth of the world is replete with instances of great enterprises which have grown from the "acorn" of a simple idea.

Franklin, watching the play of the lightning, conceived the idea of chaining this mighty force to serve humanity.

The story of Sir Isaac Newton and the apple is known to every schoolboy.

The man in our story, observing the interest shown by people in the misfortunes of others, used this very human trait as a basis for his odd advertising scheme. His growing business is proof of his foresight.

And so it is that the observant, thinking man weighs each incident—each everyday occurrence even—and questions within his mind how he may apply it to his own particular enterprise or for the benefit of his fellowmen. Nothing is so insignificant, so commonplace, that it may not contain some thought which may be utilized.

Why did they do this? What held them spellbound, once they got there? The garageman asked himself that question, while he downed a wild desire to visit the conflagration himself.

Because, he analyzed, people enjoy watching the troubles of other people—deny it or not. Cartoonists and

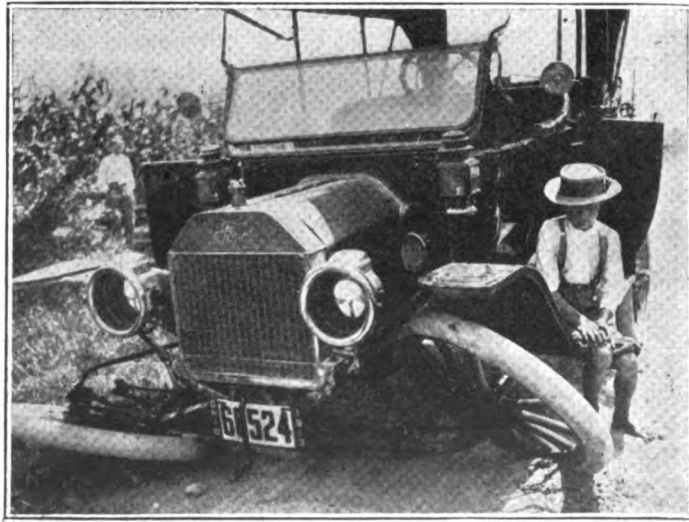
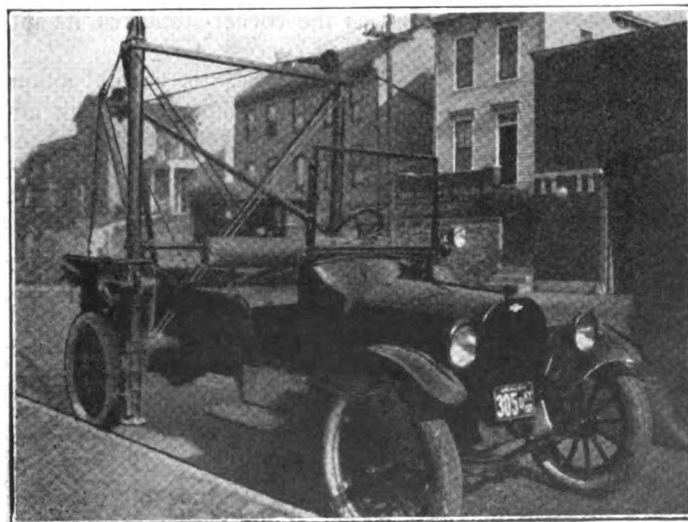
writers of jests for the comic journals know this thoroughly. Analyze their best products, and you'll almost always find them based upon the trouble of someone concerned.

People love trouble—love to investigate trouble. People follow not only fire engines, but police patrols, motor ambulances and even the motor-hearse as it drives up before a house of mourning at times.

If people will follow such things—everyone of them very commonplace in this day—why should they not follow a vehicle proving a tell-tale to troubles of another sort?

Why, for example, should they not follow a garage's repair car on its way to render assistance to persons caught in some wreck? Or, if they could not follow, because of the speed with which this repair car traveled, they would at least stop and watch the car hurtle off into distance.

In short, since a garageman must advertise, just as all other concerns must advertise these days, and since it could in nowise aggravate the misfortune of those about to be assisted for the rescuers to receive advertisement while they rode, the man reached the conclusion that here was an opportunity for some gilt-edged publicity for his house with the local motor trade.



Everyone Turns to Look at This Odd, Brilliantly-Colored Service Car. Bad? It's Easy Work for the Third St. Motor Co.'s Service Car.

To omit intermediary stages of his preparations for this peripatetic advertising, this man has had built to his special plans and specifications a wrecking-car which is unique.

It is painted a brilliant scarlet—the color fire apparatus usually assumes in that part of the country. This alone is apt to hold the eye of every passer-by. Fitted with a rather stereotyped body, the machine would catch the notice also for the curious framework of bars and cross-pieces and devices for raising weights and lowering them, which rise from the bed of the body and are attached to the sides. Arrangements have been made with the police of five cities and the sheriffs of two adjoining counties in that part of Kentucky, by which the car may disregard speed laws when engaged in its work of relief and rescue of injured cars.

Rare indeed, therefore, are the persons who may have seen the brilliant-hued, queerly-built, fast-flying motor truck who will not recall the picture it presented and, recalling this, mention it again and again. Every such mention is, of course, an advertisement for the service, the car and the owner.

Nor is the apparatus involved over-expensive for any fair-sized garage. A three-quarter ton truck of a familiar make was secured first of all. To this there was fitted the equipment put out for motorcar repairwork by an equally familiar wrecking machinery concern.

The proprietor of this combination, however, had his own ideas as to this mounting, nor does he ask any patent against others imitating these. Two huge derricks constitute the ground-pins of his pattern. Two rods extend from the rear of the truck, to work in connection with these. The rods are graduated, on call, to hold securely between them the wreck to be salvaged.

Then one, sometimes both, of the derricks is used to raise that car high in air and permit such repairs as will allow it to be towed in if it cannot be made to run on its own power; or else determine the fact that, until a big truck can be secured to haul it, it had

best be left there. Hand power alone is needed to do this lifting—thanks to the splendidly executed cable-system installed. Along with this derrick hoisting outfit, the repair truck has been equipped with a complete wrecker's tool-kit.

Three strong jacks, all tools needful for starting an automobile, and all things necessary to tow an injured car

at a merry clip when, from behind a bend, another automobile darted almost squarely upon it. There was nothing to do but turn out on a "twist," as it is called there, and this without regard to whatever else might be in the way. The result was a collision with objects flanking the pike and a sorry wreck for the Ford.

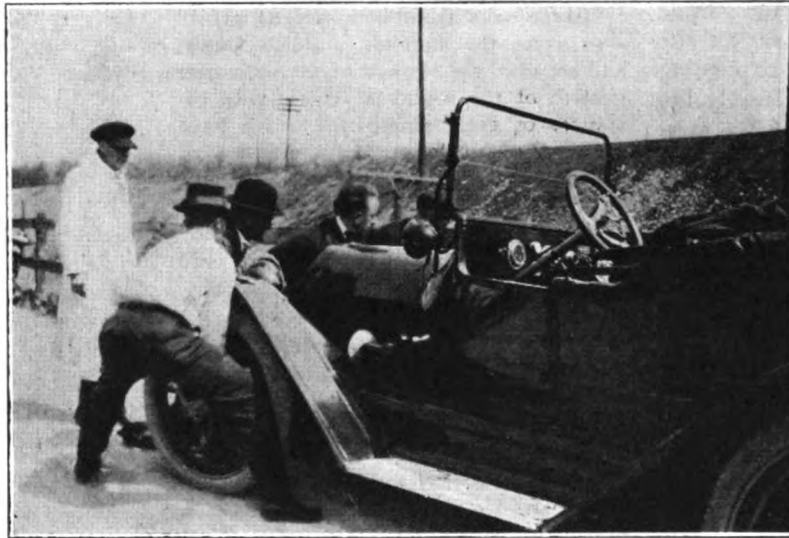
Called upon these errands, those in charge of the repair car determine with the parties in charge of the wreck whether the repairs possible shall be made at the site of the accident, or whether the ruined car shall be towed into town for repairs. In the latter case, the repairers maintain two sets of prices, both based on the distance involved in the tow.

Where the owner of the wrecked car wishes it taken to some other concern for repairs, or taken to the railroad or a river-steamer for

sending to his home town for reconstruction, one rate per mile towed prevails. Where the Third Street Motor Car Co. is given the contract to put the wrecked car back into condition, another and a considerably lower rate per mile towed is charged. In both cases, however, the charge is one based upon absolute fairness to all persons concerned.

The Third Street Motor Co. has two theories as to advertising, both of which it puts into practice at all possible times, and to both of which it points as the corner-stones of its unprecedented success.

The first of these is the old axiom that a pleased customer is the best advertisement obtainable by a garage, or any other place. The other is that, next to the pleased customer aforesaid, the best possible advertisement for a garage seeking to increase its repair trade and, through this, its trade in accessories, gasoline, and perhaps even storage, is a car whose color catches every eye the moment it flashes on the highways or the byways, a car whose construction bespeaks an errand exciting instant curiosity in all who view it, and sends all who can possibly spare the time to investigate the occasion for the journey.



Three Men Are Designated as a Crew for the Efficient Service Car.

to the garage are also included here.

At the sides of the car, there are strong, leak-proof containers for fluids—the one for two gallons of gasoline and the others for a gallon of light and one of heavy oil in turn.

These things in place, the car has its motive power arranged to carry it at a rate of 45 to 50 miles on the steepest of the Kentucky hills.

One man is, of course, all that is needed to drive, and he can usually attend to all repairs. But one never can tell what lies in store with a wreck in Kentucky. As a result, three men are designated as a crew for the car. The garage force is divided into watches, the men of each watch being required to go with the car should a summons come during the time when they are assigned to its care.

Strange and curious are the errands the car is often asked to perform. Just the other day, for example, a hurried voice on the telephone asked that it be sent at once to a remote point on a Kentucky turnpike. Arriving at the place appointed, the wreckers found a car of rather inexpensive make, standing upright upon its radiator, and the radiator was smashed in beyond repair.

The car, it appears, was traveling

Being a "Character" Has Money Value

"Rosey" Learned That Individuality in Business Is a Winner—Just as Valuable in Automotive Industry as in Any Other Business—It's the Original Idea That Brings in the Dollars—A Unique Project That Succeeded

By K. H. Lansing

Investing one's job with individuality is generally a wise proceeding, if it can be carried through, as many a man has learned to his advantage. This is because individuality, especially if it be quaint or unusual, attracts attention and makes acquaintances—and often friends.

Just cheap wit, or the mere desire to be odd, however, never got anybody beyond a curious or contemptuous glance. There must be a real, piquant individuality behind it all if it is to be a stepping stone to business success. Mere eccentricity of action or fantastic dress cannot turn the trick, as is shown in the lives of numerous "cranks." But when a man of sense does worth while things in an odd way—that's different.

Not everybody can be a "character" in that sense of the word. Some, in trying, would only lose dignity and alienate their friends and customers. To others this sort of thing comes naturally, and yet can be cultivated intensively to good purpose.

There are different ways of being a "character." One may throw all into his personality, while another may be quite commonplace, as far as looks and speech go, yet conduct business on such an individual plan as to spread his name and fame over considerable territory.

In the last category is "Rosey," of Vintage, Pa. "Rosey," whose real name is Morris Roseman, is proprietor of "The Graveyard," a most interesting and profitable "outdoor showroom" for defunct automobiles and other motor vehicles.

Vintage is a small place twelve miles east of Lancaster, Pa., on the Lincoln Highway, which gives "The Graveyard" a strategical position:

First, because of the tremendous motor vehicle traffic along the highway, and second, because Vintage is in Lancaster county, noted for its great number of automobile, truck and farm tractor users and owners.

tively small. His customers, arriving by car or truck, would go into "Rosey's" dump and select for themselves what they wanted from the heterogeneous mass, sometimes asking "Rosey's" guidance if they didn't know much about machines—which is a rare condition in Lancaster.

It might be added that many of "Rosey's" neighbors from around Lancaster and vicinity are thrifty Amish men, members of a highly respected religious sect, who own many of the largest and most prosperous farms thereabout. It is usual for a farmer in that locality to own a small run-about, a large touring car for family use, a truck or two, and at least one farm tractor, to say nothing of other farm machinery. There are between 2,000 and 3,000 tractors in Lancaster county, and the latter figure is more nearly correct.

Not long ago, because of his rapidly-expanding business, "Rosey" decided it was time to acquire more space. Jake Eaby, of Paradise—anyhow, they call the place that—had a 42-acre farm in Vintage, which he wanted to sell. It was an ambitious place for "Rosey," some thought, having a large farmhouse, two tenant houses, a barn, tobacco shed and other outbuildings. Yet "Rosey" was easily able to buy it and added it to the two acres he already possessed.

Now, "Rosey" with his acquisitions, plans to launch more extensively into the used-truck-part business—something for which there has been a "crying need," as the rural paragraphers say.

But that isn't all! He will use 15 acres of his new property for the storage of trucks, his main "estab-

We Have It At The Graveyard

Any Part You Need For Any Model Made Truck, Tractor or Automobile

Parts for 1920-12 Cylinder Haines, also Parts for 1920-8 Cylinder Cadillac. 1918 Standard Eight. 1918-8 Cylinder Regal. Parts for 1920 Hupmobile, also Parts for Grants from 1915 to 1918, 6 Cylinder Saxon, 1917 Bell, and Parts for all other Cars made.

**EVERYTHING WE SELL IS GUARANTEED
WE SHIP TO ANY PLACE ANY TIME
BY FREIGHT EXPRESS, PARCEL POST**

"ROSEY'S"

Bell Phone, Gap 42-2

United, 426 Gap

Open Evenings and Sunday

Any Part That May Be Needed for Any Car Made—Promises Rosey.

Lancaster is in the heart, or rather is the heart, of the Pennsylvania tobacco region. It has been called one of the wealthiest counties in the United States, barring those in which a city of the first class is located.

Every automobile and truck owner in Lancaster county knows "Rosey," and most of them have, at some time or other, either sold "Rosey" an old machine or purchased parts from him. Selling parts of all makes of machines is "Rosey's" big idea.

"The Graveyard" started humbly enough in 1911, but "Rosey" is so keen a business man that he just had to expand. At first his "outdoor showroom," in which were assembled all manner and makes of cars and tractors, in every conceivable state of repair and disrepair, was compara-

ishment" now being completely filled with passenger cars being torn down to fill the never-ending demand for parts.

"Rosey" also has been talking about making a landing field for airplanes, as he has a good stretch of suitable ground for that purpose. He likewise intends to handle airplane parts and has had numerous calls from aviators, of whom there are a goodly number in the vicinity.

"Automobiles, trucks, tractors, airplanes—I guess it will be submarines I'll have to handle next," says "Rosey."

"Rosey" is a cheerful character,

Return After 5 Days to
ROSEY
Buying and Selling Running and
Not Running
AUTOMOBILES
VINTAGE, LANCASTER CO., PA.
On the Lincoln Highway.

Rosey Advertises on All Outgoing Mail.

but while he is never tired of having colored post cards made of his famous "Graveyard," he does not consider his own portrait especially decorative and there aren't many pictures of him extant.

"Rosey" may keep a queer "shop,"

but he has very businesslike ideas which extend to advertising. He takes considerable display space in the newspapers of Lancaster—a city of some 50,000 inhabitants—and other nearby points, and always manages to have an attractive message in his advertisements. He never misses a chance to do business and keeps open evenings and Sundays.

Everything "Rosey" sells, he guarantees—and he does a heavy mail-order business in addition to his extensive "stop-in" trade. He does no repairing.

There is probably no place in the entire country just like "Rosey's."

Some Shop Notes for the Repairman

"It's All in Knowing How"—We Often Hear That Expression—For Knowing How Is the Difference Between Success and Failure—Here Are Methods of Tempering, Battery Repair Suggestions and Other Mechanical Hints

By F. H. Sweet

All steel tools that require tempering have to be hardened first. This is done in many ways, the tool being turned over from time to time, until it is evenly heated to a cherry-red color. It is then plunged into either a solution of plain water, salt water, or a solution of cyanide of potash in water, according to the preference of the worker. The cyanide and salt water solutions make a tool very hard. When used to turn rolls, no drawing of the temper need be done, the metal being ready for use if it has been previously ground.

In tempering machinists' lathe tools, the method adopted by good blacksmiths is to first harden the metal in the manner previously described, with the exception of not plunging all parts of the tool in the hardening solution, but leaving some heat in its shank, while the cutting edges are cold.

The edges are then quickly rubbed with an old file or a piece of firebrick or emery cloth tacked upon a block of wood. This is done so that the color can be easily seen—the color traveling down toward the shank or point. When the desired color reaches the cutting edge, the tool is plunged into cold water and the job is done. Following is a list of tempering colors, each one representing a lower degree of hardness than the one preceding it.

Straw color is the hardest. Brown the next. Then come light purple, dark purple, deep blue and pale blue.

Straw color is suitable for cold chisels where light blows are struck, or for other work where great hardness is required. Where heavy blows are delivered, it is best to temper the chisel to a brown color.

Screw drivers should be colored a light purple, and springs or other articles that require great toughness with a reasonable amount of hardness, should be tempered to a deep blue color.

There is another kind of steel on the market called "high-speed" steel. This is a most remarkable metal and is the best tool steel for roughing down work that the writer ever used. It is of such toughness and hardness that very heavy cuts can be taken; so heavy, in fact, that the cutting edge gets red hot and it operates for a long time in that condition before requiring regrinding.

I have also tried this class of steel for turning rolls, with the exception of chilled rolls, which the steel would not cut at all. It proved to be very fine on all other classes of rolls, enabling the work to be completed in far quicker time than the best crucible tool steel would allow. The crucible steel tools seemed to be better suited for turning chilled rolls, and also the one containing manganese, the carbon element being the ingredient required for turning chilled work.

Singularly enough, the high-speed variety of steel contains very little carbon in comparison with the crucible or open-hearth metal. It depends for its hardness and toughness upon the addition of chromium, cobalt, molybdenum, tungsten, nickel, vanadium and other rare metals which impart to it the extraordinary characteristics of cutting metal when the point of the tool is red hot, the chip in this case coming off with a deep blue color. Each manufacturer has his pet formula for making this kind of steel, using some or all of the

ingredients which have been mentioned.

High-speed steel is very expensive, and on account of this fact, all shops do not use it, but the demand is increasing every year. High-speed cuts the overhead cost of manufacturing down to a minimum by allowing a far greater output to be secured from machines in a day's work.

This class of steel requires different treatment in hardening, it being necessary to heat it to a "white heat," which later would positively ruin the best crucible or any of the usual kinds of tool-cutting steels. The best plan for cooling high-speed steel is to do the work in an air-blast. Oil can be used, but I find the steel will not hold its cutting edge for as long a time as when the air-blast is used as a cooling medium. This steel, unlike crucible steel, does not need tempering after hardening, as it gives the best service when left hard.

Treating sulphated plates is often an important and necessary phase of shop work. If a storage battery cell under test, sinks to 50 per cent below efficiency, there is, of course, something seriously wrong. The plates should be removed and washed thoroughly with distilled water. After washing, place them in a cell containing caustic soda in water and send a charging current through the cell.

If during the time of the ordinary charge, the sulphate on the positive plate does not disappear and the solution gives an acid reaction with litmus paper, more caustic soda must be added to the solution and the charging continued until the plate has

(Concluded on page 25)

Accounting:

The August Installment of the Series of Articles on Garage Accounting Takes Up the Payroll Account—Distribution of Payroll Costs Discussed—Expense Accounts Listed and Most Feasible Plan of Distribution Outlined—Two Convenient Garage Record Forms—Quiz Questions

By J. Newton Boddy

Auditor Accountant. Systematizer, Specialist in Automotive Accounting.

A payroll account is usually handled in one of two ways: First, where wages for labor only are shown on the payroll; and second, where wages and salaries are both shown.

Of the two methods, the latter is considered preferable because it permits of a more equitable distribution of payroll costs to the service departments and payroll expenses to the sales departments.

In the ordinary garage business payroll will be distributed under either service or sales. In the service departments, payroll will be largely a direct charge or "Cost of Sales," while in the sales departments, payroll will be largely an indirect charge or overhead.

The payroll for labor in the storage, wash and polish, livery and battery departments is usually carried as indirect labor or overhead. In any department where the hour is used as the basis for charging, labor is made a direct charge and figured as cost of sales.

Some bookkeepers carry the payroll account as one of the expense accounts. It is a much better practice, however, to carry a separate ledger account and treat it as a clearing account. Any labor that cannot be charged directly to a particular job is called indirect labor.

This may occur in many ways: Idle time, waiting for parts, cleaning up, deadhead work, spoiled work, etc. Now those departments that have both classes of labor—direct and indirect—must be so charted as to show the cost of sales and expense. A payroll should be distributed by departments, the same as shown on your chart of accounts in the income section.

It is not a hard matter to figure a payroll distribution as so much of it is

direct, especially in the larger garages. In the merchandise sales departments certain employees handle one class of merchandise, while others handle other classes exclusively. Then, too, when a salesman handles all the lines it is comparatively easy to figure a distribution of his salary by approximating the amount of time which has been

We have now arrived at the point where we have distributed the payroll into direct charges or cost of sales, and indirect charges or expense. We will, therefore, again schedule expenses, starting with this account.

It is necessary now to thoroughly review the various items before taking up the problem of distribution entering into general expense. These were discussed in our May issue.

A form is illustrated which may be used for payroll distribution. In case this form does not make provision for enough departments, a special leaf may be furnished to provide for any number of departments desired. Merchandise sales may be detailed on a special form. The reverse side of the sheet illustrated shows 19 columns. There is a binding

Payroll	Power
Rent	Entertainment
Advertising	Rebates and allowances
Salaries (not included in payroll)	Sales policy
Commissions	Law and audit
Fuel	Supplies, office
Bad debts	Supplies, shop
Insurance	Postage and revenue stamps
Service car	Express, freight, cartage (out)
Depreciation	Trade papers
Light	Outside labor (exclusive of cost of sales)
Telephone and telegraph	New car expense
Life insurance (co-partner)	Used car expense
Association fees and dues	Donations
Printing and stationery	Loss and damage
Repairs and alterations	Spoiled work
Employment and welfare	Guarantee service
Taxes	Sundry petty expense
Small tools	

Chart Suggesting a Schedule of Expenses, Beginning with the Payroll Account.

spent in each of the departments.

Office salaries are overhead expenses and should be properly distributed over every department. Night-man wages should be distributed according to the amount of his time used by each department benefiting from his services. Where a labor account is carried as a general ledger account like merchandise or payroll, it is debited from the payroll account and credited by all direct labor, cost of sales, etc. The balance is indirect labor, often called "non-productive," and is charged to expense according to departments.

This makes "Labor" a clearing account the same as the payroll account, cost-of-sale account, or cash-sales account. It is the usual practice, where labor is carried as a general ledger account, to dispense with a payroll account and carry other items of the payroll account direct to the expense account.

margin of 1½ inches.

This form is so printed that it may be used in cut-leaf form, and thus permit of the writing of the names but once a month. The distribution of the payroll shown is tentative only, but will serve as a guide to the average garageman. Each one must distribute his payroll to meet his special requirements.

In posting the payroll distribution, when completed, the payroll account is credited with the total of the amount column and the cost-of-sales account or jobs account debited with amounts of direct labor, and the labor account or salaries expense account debited with the balance. These may be entered in two accounts—labor or salaries—or may be divided into detail as labor, sales salaries, office salaries, floormen's wages, etc.

The main point to get fixed in one's mind is that all indirect payroll is an overhead expense to be treated in the

Law in Connection with Warranties

Can You Distinguish Between the Expressed and the Implied Warranty?
Special Rules Are in Force as Applying to Machinery—Rulings Made by
the Courts in Several of the States on Implied and Expressed Warranties

By Chesla C. Sherlock

There are two kinds of warranties under the legal conception of the term—expressed and implied. An expressed warranty is a special warranty that expressly binds the maker thereof as to the fitness of a particular thing; while an implied warranty is a guaranty implied from the nature of the thing, the relation of the parties, or the agreement between them.

Warranties cover a wide field and take in almost every phase of contractual relation. As applied to machinery, some special rules are in force that do not apply in other cases. Especially valuable and interesting is the rule of law as to which warranty governs the sale; that is, does the fact that a manufacturer or mechanic expressly warrants his machine exclude or include implied warranties, or must the purchaser stand on the expressed warranty alone?

The Kentucky court states the general rule to be that where there is an expressed warranty, there is no implied warranty. In the case under consideration, the contract provided that the machinery was sold subject "to the following expressed warranty and agreement, and none other."

In Michigan, the rule is held to be that if there is "an expressed warranty as to the working qualities of the machinery, there is no implication that the machinery is fit for the purposes for which it was purchased."

In Indiana, the court held that this rule does not apply where there is an expressed written warranty, since, in such cases, implied warranties are excluded. In making this ruling, however, the court recognized the fact that, when a machine or other article is sold for a particular purpose, there is an implied warranty that it is reasonably fit for the purpose for which it was made and sold.

In Georgia, it is said that only in the absence of expressed warranties can resort be had to an implied warranty that a machine is reasonably fit for the use intended.

In Illinois, the rule is: "Where a

manufacturer or machinist or mechanic furnishes a heating apparatus designed for heating a specific building, he impliedly warrants the sufficiency of the apparatus for the purpose intended. This implied warranty, however, cannot be availed of if the apparatus is sold upon an expressed warranty as to the temperature to which it

TWO NECESSARY THINGS.

There are two necessary things for the enrichment of life, mentally, physically, socially, and spiritually. They are very simple and are known of all men. One is hard work and the other is a determination to do right.—Calvin Coolidge.

will heat the room which it is designed to heat."

In a Wisconsin case, it was stated that an expressed warranty of workmanship and material of cream separators excludes an implied warranty of fitness.

In a Maine case, the court said: "The existence of an implied warranty that an automatic governor should be suitable for the purpose of the buyers' plant is negatived by the fact that the contract of purchase contained an expressed warranty as to quality as well as to speed, and the governors were such as the seller in the ordinary course of his business manufactured for the market, the general rule being that where an expressed warranty is made upon a sale, no other will be implied."

The Missouri court, however, has taken the other side of the question. It has held that there might be expressed warranties that do not exclude implied warranties, as there are any number of implied warranties that were never contemplated at the time the expressed warranties were made. This exception was not held, however, to apply to an implied warranty which, in itself, formed an integral element of the express warranty, into which it merged and by which its effect was circumscribed.

The holding of the Missouri court is on the theory that the expressed warranty is something wholly independent of the implied warranty. This distinction is as important as the distinction between the expressed and implied warranties themselves.

It is a general rule, then, that an expressed warranty as to a particular phase of a thing will exclude all implied warranties as to the same thing. This rule is supported by the great weight of judicial authority and is practically universal. There are, however, some exceptions to the rule that are equally well supported by the weight of authority.

In order for the general rule to apply, the character of the article warranted, as well as the expressed warranty thereto, must include all implied warranties on the same subject. The expressed warranty must also be of such a nature as to negative any contention that the manufacturer or mechanic intended to assume any other obligation than the one assumed in his expressed warranty.

If such a tendency does clearly exist, the courts are likely to declare that the implied warranties and the expressed warranties are separate in the particular case.

The law of warranties is so comprehensive a subject that it is possible to state here only the rules in force in cases likely to be of interest to garage keepers. The rules of law are the guide-posts that point the way, and when a man is once familiar with the rules, he may proceed without stumbling through a maze of hazy legal decisions and counter-decisions.

The things to remember are that an expressed warranty excludes all implied warranties on the same subject, and that implied warranties will be considered either in the absence of expressed warranties or where it can be inferred from the agreement of the parties, or the nature of the thing warranted, that implied warranties were not intended to be included in the expressed warranty.

Folks Never Do Like Titewad Dealer

Sometimes Folks Get to Thinking About Sents Like They Was Dollars—If You Go to a Place Where Theres a Speshul Deel and Dont Get It You Probly Wont Go There Agen—Putting Things Over on Customers Is Bad Bizness

By Frank Farrington

Deer Pete:

Remember old Sniffy Pickins that used to run the grocery in Pinkvill Pete? And we used to go there to get things for our fokes and the old titewad wood brake a cracker in 2 to make the skale ballans? Say Pete I never liked a titewad storekeeper did you? And its just the same in the garaje bizness. Titewads dont fit anywhere.

I was on my day off the other day and I was looking around the other garajes in Pinkvill. I was into Dunnings vizziting with a feller there and a man cum in and bawt 5 gallons of oil in a can he brawt with him. When he cum to pay for it it was three-75 and he counted out all the munny he had with him and it cum to three-68.

Well what did old Dunning do but take the mans munny and say heed charge up the other 7 sents.

The man sed all rite and went away and diddnt look like heed be back soon.

Old Dunnings wife she was there and she sed, "Why, Georje, why diddnt you tell him to never mind about the other 7 sents. Its such a littel."

And Dunning sed, "7 sents is just as good to me as it is to him and that 7 sents wood cum rite out of the profits and if I did that all the wile where wood enny profits be? Plenty of fellers wood always be just 7 sents short just to beet me."

But his wife diddnt agree. She cum rite back at him. "I kno it, Georj, but when I go in a grocery store where I like to trade, they sumtimes throw in sumthing or a littel candy for the children, and Ive herd you tell about how you like Ferns Drug store becaws they aint afraid to hand you a cigar once in

a wile and theyre kind of generus. Now you wont giv a man haf the price of a cigar and youre going to charge it to him and probably send him a bill. If I was him Ide never pay it. Heel think youre awful stingy."

Well, old Dunning he thawt it all over before he sed ennything more and then he sed, "Mebby youre rite at that. I gess a feller gets to thinking

Of coarse a feller cant make enny munny on what he gives away, not in one sence, and yet he can make munny giving things away too, cant he? What a good booster you and me wood of bin for old Sniffy Pickins if heed given us a peece of candy once in a wile. I gess weed of cum to his store every time we got sent on enny errand. No use talking, fokes like to do bizness with a guy thats generus and they hate titewad places.

Theres a grocery shop almost next dore to our garaje and the feller in there advertised sumthing speshul the other day. He advertised heed giv 3 cakes of soap to every customer that bawt 2 dollers worth or more on the next Saterdy. Well ma told me to go and get sum grocery things there and she giv me the 2 bux to get em with.

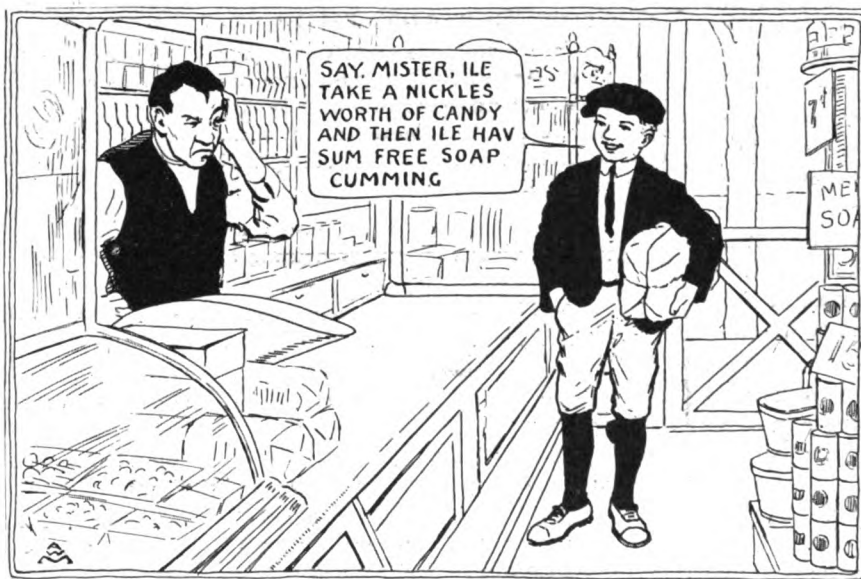
So I went in when

I was starting for

home and I got what she wanted and it only come to one-95. Did the groser say to me "Why dont you buy 5 sents worth more and you can get 3 cakes of soap free?" Not much he dident. He kep his mouth tite shut and he took my munny and beet it for the back of the store, hoping Ide get out and not think about that soap. He diddnt kno me, did he Pete?

I sed, "Say Mister, Ile take a nickles worth of candy and then Ile hav sum free soap cumming." He lookt as if Ide askt him to make me a prez-ent of a doller. O he cum acrosst all rite but I cood see it hurt his feelings. Now you kno what Ide think of that guy, dont you Pete?

There he advertised a speshul offer and then he got cold feet for fear fokes wood take him up on it, and so he diddnt put the offer in the window and



"No Use Talking, Folkes Like to Do Bizness With a Guy Thats Generus and They Always Hate These Titewad Places."

too much about the odd sents. I spoze if I sed to that man to forget it, heed of bin more frendly—7 sents worth ennyway—or I mite of sed all rite to pay me 7 sents more next time he was getting gas if he happened to think of it and not to pay it if he forgot it. I gess youre rite it wood make him feel better. It issent that Ime stingy but I dont think about it."

And heez rite at that, Pete. Dunning aint a titewad like old Sniffy Pickins. He just was thinking about it like it was dollers insted of sents. But the trubbel is the customers dont kno that. They think the feller hates to see 7 meassely littel sents get away from him. Aint it so, Pete? Your boss will giv a man a 15 sents segar one day and then the next day charge him up for 3 sents he was short on a fountin pen filler mebbby.

he diddnt hav it up inside the store, and he hoped nobody wood cum. He was trying to riggle out of it all he cood. I watcht him with sum other customers to see.

I thawt that was pretty rotten but the next day the boss had a sine up in our window that tires was speshul bargins for a week and that everybody that bawt a tire wood get a tire gaje free. And I saw that Persy nutt sell tires to 2 men and they had to ask for that free tire gaje or they woodent of got it a tall. So we just lost sum of the creddit for giving em a gaje becaws they saw we hated to do it and woodent of made good if they haddent put it rite up to us.

It looks to me like this Pete. If a speshul offers a good thing, then you awt to see that everybody that cums in knoze about it and sees it advertised in the garaje and is askt by us if they dont want to take us up on it. Weed awt to giv em the free premium without being askt and weed awt to ask em if they kno about the offer if they dont speak about it.

If its a good thing, the more fokes we get in on it, the better. If it aint a good thing, then fer cramps sakes whats the good for making it a tall? Aint you seen sum garajes Peet that sell gas for less than their cumpettiters and then keep dum about it for feer sumbody may want to buy sum? Skeems thats ment to get more bizness wont get it if you keep em secret. Ile tell the world. Ime that way. Tell everybody and giv em a chanse to get in on the deel.

If you go in a place where they got a speshul deel on, and youre entiteld to that deel and dont get it, when you find it out you kno where you think that place can get off at. They dont see you agen unless just to tell em what you think about sum things. And if youre almost entiteld to that speshul deel and they dont tell you soze you can get in on it, youre almost as mad.

Its pretty bad bizness putting enny littel thing over on a customer. Aint it so Pete?

So long old perrygorick and Pippy-cack
BILL.

Automotive Industry Wins Vital Place in "Scheme of Things."

The vital place which the motor car has taken in daily modern life has been impressed anew upon the people of this country by the recent interruptions and con-

PENLINGS FROM THE PEN OF DIKE.

I talked with a merchant the other day who had his big mercantile establishment washed away by a flood. It had taken him years to build up his business. Now all was lost and no insurance. He greeted me with a smile and said: "A man may be down, but never out. I can come back. Good merchandise and advertising will put me back." And I thought "The man worth while is the man who can smile when everything goes dead wrong." So why complain, Mr. Garageman, if business is dull one day. You've got no "kick comin'."

Don't get excited if a tourist fusses a little bit. Just put yourself in his shoes. That tourist may have driven 200 miles that day over bum roads. He's got a right to fuss a little. Start a "Better Roads" movement and get better roads and you won't have so many ill-tempered tourists.

Think big things, think big sales, think big ideas, and soon you will make big sales. But, if your thoughts ramble to small things, small sales, small ideas, then you will make small sales, and soon you will be known as a "small potato" in the business garden.

Babe Ruth is the leading batter in the big leagues. Are you the leading automobile salesman in your automobile league?

Babe Ruth says he is out to beat his last year's record in home runs. Are you out to beat your last year's sales? Remember this year is the fighters' year.

Happy is the dealer who renders service with a smile.

Electric fans in a garage waiting-room are as essential as straws at a soda fountain.

Keep your tourist accessory stock well up now. Every time you missed selling a tourist something he called for it was profit gone, never to return.

Have clean towels around your washroom. A print-shop is the only place where the towel may be soiled.

Good showcases and good wall fixtures around your garage are as essential to your business as they are to the dry goods merchant or the clothier.

Show me a man who never made mistakes in business, and I will show you a man who never had any business.

Every city has its knockers. Don't let them loaf around your place of business, for a knocker loafing around a garage is worse than a rattle snake around a millinery shop.

Attend automobile dealers' meetings. Attend Commercial Club meetings. Be at the meetings, even if you can't make a speech. Your presence will be a help to the one who can.

gestions of railroad transportation. The automobile and the motor truck have kept big plants going, rushing to their receiving depots the mountains of material which keep men profitably at work.

The automobile, beyond question, is a distinct advance in civilization. The automotive industry today ranks as second in volume of finished products. The motor car today carries more passengers than all the steam railroads in the United States. Motor trucks may soon be carrying more freight than all of the railroads.

"The gasoleneless Sundays of 1918 and the coal famine of early 1919 showed that the 4,000,000 cars serving between 12,000,000 and 15,000,000 people saved more than 1,000,000,000 tons of coal a year," says the Willys-Overland Co. in a recent bulletin. The use of automobiles and other gaso-

lene engines by factories in the manufacture of power during the coal strike of 1919 demonstrated the value of the motor car to keep the wheels of industry turning.

"Motor-car passenger transportation now more than doubles that of the railroad. Motor cars of the country perform, it is estimated, transportation service equivalent to the carrying of 100,000,000 people 1,000 miles each year.

"The latest report of the Interstate Commerce Commission shows that the railroads last year carried a billion persons an average of 43.2 miles. Reduced to the same mileage basis upon which motor transportation is figured, the railroads' cars carried 100,000,000 persons only 432 miles, against 1,000 miles in motor cars. This is the solid foundation upon which the motor car industry is founded."



Legal Rulings of Interest to Garagemen

Liability in Case of Misrepresentation by Selling Agent—When Driver's Vision Is Obscured Care Commensurate with Circumstances Required—Garageman's Lien for Repairs Effective Only as to Owner and Those with Notice

By R. R. Rossing

Owner of Car Liable For Selling Agent's Misrepresentations.

Where the owner of automobiles ships a car to a selling dealer and reserves title in himself, the selling dealer is the agent of the owner, insofar as the public is concerned.

When the selling agent represents that a second-hand car sold is a new car, he is acting within the scope of his authority, where innocent purchasers are concerned, and such purchasers may sue the owner for breach of warranty.—*Anticich v. Motor Car Inn Garage*. Supreme Court of Mississippi. 87 Southern 279.

Contract For Use of Pump Held to Be Valid.

A contract, whereby plaintiff oil company lent defendant garage partnership a gasoline pump to be used in the sale of the oil company's gasoline, in consideration of which the partnership agreed to purchase for cash all the oil company's gasoline, accepting conditions requiring them not to use the equipment for any other purpose than that specified. There was also a provision that immediately upon infringement of the contract, the oil company might remove the equipment or bill it to the partnership at its initial value.

The court held the contract not void as against public policy, not constituting a restraint on trade greater than necessary for the oil company's protection.—*Quincy Oil Co. v. Sylvester*. Supreme Judicial Court of Massachusetts. 130 Northeastern 217.

Garageman Recovers \$50 Tax For Dealing in Accessories.

The fact that a dealer would have difficulty in selling a particular make of automobile if it were known that he did not carry parts for such cars in stock is a matter of common knowledge, of which the court can take notice.

The fact that an automobile dealer, handling a particular make of cars and accessories and parts for it, also sold accessories to users of other makes of cars, does not make his accessories business separate from his dealer's business.

Keeping stock and selling spare parts and accessories for the particular make of automobile handled by a dealer as required by the dealer's contract with the manufacturers and as necessary to promote the sales of that make of car is

an integral part of the business of an automobile dealer on whom a license tax is levied by General Revenue Act of 1919.

General Revenue Act of 1919, imposing a privilege tax on automobile dealers and another privilege tax on dealers in automobile accessories, does not require an automobile dealer, who sold automobile accessories as an integral part of his business, to pay the accessories tax, especi-

STUDY AND THINK.

If you will take the trouble to study and think you will unquestionably stand out among your fellows. If you will throw yourself into your job, whatever it is, study all you see and hear, really crave a chance to use all your powers, you need not generally hunt success, for success will seek you out.—A. Barton Hepburn.

ally since the provision imposing the tax on automobile repairshops expressly provided that such tax should be in addition to the privilege tax imposed upon automobile dealers.—*W. F. Stockwell v. Hailey*, tax collector. Supreme Court of Tennessee. 229 Southwestern 382.

Garageman Liable For Burning of Car While Vulcanizing.

When property is delivered to a bailee, who holds it for hire, and in a suit by the bailor it is pleaded that because of negligence of bailee, property has been destroyed by fire, on proof of allegations of petition the onus, under Civ. Code 1910, article 3469, is placed on bailee of showing due care and diligence in protecting and keeping the property.

In an action against a garage keeper for the destruction of automobile by fire, starting when materials in vulcanizer caught fire, a ruling on a question to a witness as to whether it was customary to leave vulcanizer unattended when fixed, that the custom should be left out, was held not erroneous.

Overruling an objection to a question of the witness as to whether placing the vulcanizing department next to an elevator shaft was the placing of it at the most dangerous point was also held not an error.—*Hight Accessory Place v. Lam*. Court of Appeals of Georgia. 105 Southeastern 872.

Driver's Vision Obscured by Rain at a Crossing.

In an action for damage to an automobile struck by a street car, at a crossing, evidence was presented that immediately before the accident there had been a heavy rain, which had partially obscured vision through the wet windshield.

It was held that this evidence justified the instruction that, "if the vision of the driver of an automobile is obscured by a blinding rain, or otherwise, at a crossing, it is his duty to take care commensurate with such circumstances."—*North State L. Co. vs. C. C. Ry. & L. Co.* Supreme Court of South Carolina. 105 Southeastern 406.

Theft of Car From Garage by Pretended Owner.

Where an automobile was temporarily left in the garage while the owner was about his business in the vicinity, a claim of ownership and possession thereof by another person was a taking of the automobile rendering such person guilty of theft.

A car left temporarily in a garage while the owner is about his business in the vicinity is legally in the care, control and general management of the owner, as well as the special owner for all purposes of prosecution for theft. *Smith v. State*. Court of Criminal Appeals of Texas. 227 Southwestern 1105.

Garageman's Lien Ineffective Without Notice.

Sections 3333 and 3339, Code 1915, of New Mexico, as amended by Chapter 65, Laws 1917, could reasonably be construed to provide for a lien upon an automobile for supplies, etc., furnished the owner, only so long as such automobile remained in the possession either of the garage owner or the owner of the automobile or a purchaser with notice; and such a construction would be adopted, were it required in order to uphold the constitutionality of the act.

Sections 22 and 26, c. 65, Laws 1917, construed, and held, that the lien of a garage owner for repairs furnished and of a workman for labor performed on an automobile is in force after the possession of such automobile is voluntarily surrendered, only as to such owner and those with notice thereof, and is not effective as to innocent purchasers without notice.—*Abeytia v. Gibbons Garage of Magdalena*. Supreme Court of New Mexico. 195 Pacific 515.

Trouble—How It May Be Detected

Sometimes the Car Develops Symptoms of Faulty Action that Are Difficult to Locate—In the Article Which Follows an Automotive Expert Tells of Methods for Trouble-Finding and Suggests a Few Practicable Remedies

By J. N. Bagley

While this article is intended to deal more particularly with the Ford car, many of the symptoms and remedies can be readily applied to other makes of cars as most of them are constructed along the same or similar lines.

Engine Refuses to Start.

When the engine refuses to start, one of the very first things to look after is the fuel supply, for the tank may either be empty or the supply line between the supply tank and the carburetor stopped. In case there is plenty of gasoline in the tank and it flows freely to the carburetor, examine the carburetor for dirt, for many times the small spray nozzle will become stopped, preventing the spray of gasoline from reaching the cylinders.

Often this stoppage can be removed by flooding the carburetor, except in extremely stubborn cases, when it will be necessary to remove the carburetor and clean it thoroughly.

The engine may be flooded because of the choker being held out too long. When this is the trouble, it can be determined very quickly by the way the engine performs when it is turned over. It will try to start, making small puffs of smoke (usually black) at the exhaust. The engine will make a few revolutions and die, but if the cranking is continued, and flooding is the trouble, it will continue to act better each time it is cranked until, finally, under a seemingly heavy labor, it will manage to start.

It is an easy matter to flood motors, especially if they have been stopped but a few minutes and are quite hot. There are times when, for some unknown reason, the float in the carburetor will stick in the shut-off position and will not allow the gasoline to enter the float chamber, in which case a sharp tap somewhere about the bowl will usually loosen it.

In case the carburetor needle valve is closed almost or entirely, no matter how much the choker is held in, the engine cannot get sufficient gasoline to make an explosion. This will make the trouble appear as though it was in the line or the tank. Therefore, it is always a good plan to open the needle valve wide when gasoline does not come through and note the results. Should the engine start, it can be quickly re-adjusted before the engine has had time to flood and foul the spark-plugs.

In extremely cold weather the car will frequently start hard although there may be plenty of gasoline in the carburetor.

This is due to the low-test gasoline that cannot be vaporized sufficiently to fire from the spark.

An air leak in the manifold will prevent the starting of the engine unless the needle valve is open extremely wide. Poor compression will make starting difficult, owing to a portion of the compressed gasoline passing by the rings to the crankcase below. Water in the cylinder, due

A man of long experience along automotive lines, J. N. Bagley, the author of this article, offers here suggestions for trouble locating and remedying which will undoubtedly furnish helpful ideas to many of our readers.

Engine and ignition troubles are discussed in detail and the methods of detecting and remedying faults suggested, while particularly applicable to Ford cars, will be found equally serviceable in dealing with other makes of cars.

to a defective gasket, will prevent the engine from starting and, if this trouble has been long standing, will cause the valves to become rusted and pitted until it will be necessary to regrind them.

Ignition Troubles.

In case the engine will not start when the switch is on the magneto side, try throwing it to the battery side and note if each of the vibrators buzz as the pistons reach firing position. In case the engine starts readily when the switch is placed in battery position, it indicates one of two things: Either the magneto is at fault or the switch on the magneto side is defective.

However, there are times when a dirty timer will act very much like a faulty magneto or a broken switch. In case the timer is at fault, the fault can be found by throwing the switch over to the magneto side after the engine has been started on the battery side, in which case it will usually run after it has been started on the battery.

In case the engine does not operate properly when the switch is thrown to the magneto side, there are a number of things that may be at fault. The trouble may be due to dirt or something under the contact spring on the top of the transmission case, or the timer roller may be sufficiently worn to allow contact only at the outer edge.

The circuit may be broken in the magneto coils. This may be determined by

making the lamp test, as we term it. To make the test, hold one of the test points on the terminal block and hold the other test point on the plate on which the coils are mounted. If the lamp will not light when the contacts are made, there is an open circuit and it must be located before it is possible to proceed further.

The first step is to inspect the connection from the terminal block to the coil and, from the new coil on the right, to the same plate on which the coils are mounted. After this has been done, inspect and test out all of the connections between the coils. There are times when the connections having the spring tensions in the back of the coil-box become corroded sufficiently to prevent a firm contact, in which case it will be necessary to remove the corrosion with some sort of a scraper or a bit of emery paper.

Test each of the coils separately by holding the test points on the bare spots, as already mentioned in making the magneto test. If the coil is defective, the test lamp will not light. Therefore, in case the lamp will not light, the coil should be removed and a new or repaired coil substituted.

The trouble might be in the ground connection in the coil-box and this may also be tested out with the test lamp. Remove the ground connection of the right-hand top coil from the plate on which the four coils are mounted, and hold one end of the test point on the terminal of the left-hand top coil and the other test point on the plate on which the four coils rest.

In case the test lamp lights, there will be found a ground in one of the coils. It will now be necessary to go over each of the coils and test them for leaks in the insulation. In case the trouble cannot be found with the coils connected in place, it will be necessary to remove them and make the test on each one separately until the trouble is located. When the grounded coil is found, it will be necessary to replace it with a new coil or have it repaired by someone making a specialty of coil repairing.

Locating Short Circuits.

To locate short circuits, a very good plan is to use the ammeter circuit-tester. Scrape the insulation from the connections between the coils and test each coil separately until the trouble is located. In case any one coil takes more current than the coil next to it, it has a partial short-circuit and should be unwound and re-insulated.

To make the test, which we call the reverse coil test, connect a battery to the wires connected to the two top coils and test each of the coils by bringing a compass towards it. Successive coils should attract opposite ends of the compass needle. In case two or three of the coils attract the same end of the compass needle when this test is made, it indicates that the center coil is reversed. Therefore, it may be necessary to reverse this particular coil, as well as all the remaining coils on the plate.

The test should be continued with the compass until each one of the remaining coils has been tested.

Testing the Timer.

After following out the tests and everything is found to be in good condition, down to the timer, the next step in order will be to make sure that the trouble is not there before looking further. Note that each of the four wires is securely fastened to the post on the outer shell of the timer, after which it should be removed from the engine and the inner race examined very closely.

Some of the segments may be gummed with grease and dirt until the spring pressure on the roller is not sufficient to break through, in which case no contact will be made when the brush passes over the segment. Remove all dirt and grease with a rag saturated with gasoline and smooth up any pieces that may be rough or irregular with sandpaper.

Make sure that the roller spring is strong enough to hold the roller against the walls of the timer when it is in place. Examine the bearings in the roller, for many times the pin will be worn until the roller arm will not have sufficient reach to force the roller to the walls. In case the arm does not have sufficient action to force the roller out to the walls, it can be sprung sufficiently to make a firm contact by placing a screwdriver behind the arm and forcing it outward.

Testing the Coils on the Dash.

After going carefully over the timer, as has already been explained, and finding no trouble, pass on to the coils on the dash and examine them for defects. Remove the wires from the upper row of posts on the back side of the dash. Switch the ignition on the battery. Then with a pair of pliers or a screwdriver or, if convenient, a short piece of wire will be better, short-circuit each of the posts by connecting the wire to the post and passing it over to the metal on the engine.

As the test is made, if everything is in good working order, each of the coils will buzz when the contact is made. Should one or more of them fail to buzz, try making a slight adjustment of the contact points. If this does not start the buzzing, remove the coil from the box and examine the contacts on the coil-unit as well as the spring contacts in the inside back of the box.

Many times these contacts become blackened or corroded sufficiently to prevent a contact being made until they are smoothed up with sandpaper or a scraper. Care should be taken that the contact points are clean and free from pits. In case they are not, they may be smoothed up with a fine sandpaper, or a file called a magneto file, which is made for this purpose.

All of the remaining terminals on the box should be gone over carefully one at a time, and the nuts tightened very carefully, for many times they will work loose just enough to break the circuit and yet seem to be tight. It will be noticed that there are also a number of solder joints in the coil-box. Any one of them may be broken apart and yet, when looking at them, they may seem to be intact.

A very good plan to determine whether or not a joint is broken is to use the test lamp, connecting one of the points with the wire to be tested and the other to the flat metal strip in the bottom of the box. If the trouble has not yet been located, test each of the coil units with the lamp test outfit. A good plan for doing this is to remove the coils and test each of them separately. Test across—that is, hold the test points on the two places just mentioned.

In case the lamp does not light, take the voltmeter and make the test. If no reading is shown, it is an indication that the high-tension winding is broken down at some point and will have to be either replaced or repaired. Test across from the button to the arm on the top of the coil. If it still does not light, the primary or low-tension winding is broken down at some point.

Another test is to place a piece of paper or rubber between the points of the vibrator and test across from the movable to the stationary bar. If the test lamp lights, it indicates that the two bars are short-circuited at some point. The short-circuit may be in the wires which are connected to the bars, or the primary and secondary windings may be short-circuited with one another.

The cable carrying the current from the coil to the timer can be at fault. The coil and timer should be disconnected at each end and the test light used on each of them to determine whether they are carrying the current or whether they are broken at some point inside the cable, or loom, as it is sometimes called.

When Engine Starts but Misses Fire on One or More Cylinders.

When the engine starts and runs along on one, two or three cylinders, there may be a number of things that are at fault. For instance, the trouble may be in the fuel, ignition, valves or piston rings, etc. In the first place, stop the engine and turn it over by hand and note the compression. In case it is weak on any one of the cylinders, it will cause the engine to miss, especially when at low speed.

In case the compression is good on all of the cylinders, the trouble may be somewhere in the ignition. Either the plug is at fault or some of the wiring system is loose or broken down. In case the mixture is over-rich, a black smoke will be noted at the exhaust and it will have a strong odor. This, however, can be corrected by needle valve adjustment. A colorless exhaust, with no odor or backfire, indicates ignition trouble. If the trouble is found to be in the ignition, locate the missing cylinder in the following manner: Close the throttle. Take a screwdriver with a wooden handle and hold the metal tip of the screwdriver up against the terminal on the top of the spark-plug, letting it pass to the engine. This will short-circuit the plug.

In case the engine acts just as it did before the plug was short-circuited, the trouble is located; that is, the faulty cylinder is located. On the other hand, if the engine slows down when the plug is short-circuited, the cylinder is working all right and the next cylinder should be tested in the same manner.

Another satisfactory way of locating the missing cylinder is to remove the coil-box cover and hold down the two outside vibrators with the fingers. If the two inside vibrators are working well, the exhaust will sound like a two-cylinder engine. If it should run on one cylinder only, continue to hold down the two outside vibrators and reach over and hold down the vibrator next to them. If the engine stops, it indicates that the remaining vibrator is not firing. Start the engine again and adjust the vibrator, and make sure the trouble is not in the coil before proceeding further with the test.

Some prefer to hold down only one of the vibrators at a time, but it is a little harder to detect the missing cylinder in this way than with the method just mentioned, especially if the engine is worn considerably, owing to the noise it makes.

Going back to the screwdriver test for testing the spark-plugs, we can tell whether or not the points of the plug are spaced too far apart. When holding the screwdriver blade against the terminal on the spark-plug and against the engine, if the spark passes over a distance of more than $3/32$ nds of an inch when the point of the screwdriver is raised from the engine it indicates that the points of the plug are entirely too far apart and should be closed up a trifle.

The points should be adjusted so that a worn dime will just pass through tightly. In case the greatest distance between the screwdriver and the plug across which the spark will pass is much less than $3/32$ nds of an inch, the voltage of any one of the coil units corresponding to that weak cylinder will indicate that the plug is partly short-circuited, either by oil or a carbon deposit. The plug should be removed and cleaned or a new plug substituted.

This test can also be made by removing the spark-plug and holding it about $\frac{1}{4}$ inch from the cylinder. If the spark will arc the gap, the voltage of the coil is as it should be. After the spark-plugs have been taken apart for cleaning, care should be exercised in replacing the packing nuts so that they are not set up too tight or, when the engine is started up and the plug is hot, the porcelain will very likely be broken.

In Case the Engine Backfires.

In case there is backfiring in the cylinder, it is because the charge is ignited before the piston has nearly reached the top of the stroke and the momentum of the flywheel cannot throw it over against the pressure created by the burning gasoline. This backfiring may be caused by the spark-lever being too far advanced, or it may be due to a short-circuit in the timer, causing one or more of the vibrators to vibrate continually.

Pre-Ignition.

Pre-ignition may be due to carbon deposit on the piston head or in the combustion chamber of the cylinder. In this case, the deposit takes fire and ignites the charge of gasoline under compression before the piston has reached the proper position for firing.

The indication of pre-ignition is a sharp "clink," resembling very much that of tapping a small chisel on the work-bench. This will affect the running of the motor, inasmuch as the most of the power is killed by back pressure. There are a number of methods of removing the carbon deposit from the cylinders, but the most satisfactory method is to remove the cylinder head and scrape it out.

Knocking.

There are a number of things that may cause the engine to knock, and every knock will have a separate and distinct sound all its own—that is, no two knocks sound exactly alike. A carbon knock causes a short metallic sound, as already mentioned, resembling very much an advanced spark.

The difference is usually determined when the engine is first started, for a cold engine will not develop a carbon knock. The advanced spark will knock when the engine is cold just as well as when hot. When an excessive carbon deposit is present, and the engine is well warmed up, it can be detected by throwing the switch into neutral position, when the engine will continue to run for a few seconds and at each and every revolution will have the short, sharp clink.

Aside from the carbon and ignition knock mentioned we have various other bearing knocks, such as the connecting-rod knock, main-bearing knock, wrist-pin knock, camshaft-bearing knock, etc.

The connecting-rod knock is easy to detect, for it usually takes place at each and every revolution of the flywheel. It can be detected by coasting the engine down a

sharp grade. Speed the car up to 15 or 20 miles an hour and suddenly retard the gasoline and spark-lever, allowing the weight of the car to run the engine. This will make the knock more prominent and it can be easily detected.

The main-bearing knock is considerably heavier than the connecting-rod knock, sounding quite a little like a blow with a heavy hammer, the loose bearing next to the flywheel being a trifle heavier than either the front or center bearing. The

WORK ACCOMPLISHES.

I pity no man because he has to work. If he is worth his salt, he will work. I envy the man who has a work worth doing, and does it well. There never has been devised, and there never will be devised, any law which will enable a man to succeed save by the exercise of those qualities which have always been the prerequisites of success—the qualities of hard work, of keen intelligence, of unflinching will.—Theodore Roosevelt.

sound made by the rear bearing, when loose, can best be described as a thud.

When the engine is running along at a fair speed—that is, a speed that would propel the car at the rate of 20 or 25 miles to the hour—cut out one cylinder at a time by holding down the vibrator on the coil-unit, at the same time accelerating and retarding the engine to produce the knock.

In case the knock disappears, it indicates that the trouble is in the system of that unit which is held down. In case the test is made on cylinder No. 1, the chances are that the front main bearing is at fault; while, if the unit tested is No. 4, it is more likely to be the rear main bearing.

The piston slap, while it resembles a knock, cannot really be classed as a knock, for it is more of a metallic tapping which is noticeable when the engine is cold and before the lubrication is dashed up against the walls of the cylinder. The piston slap will be more noticeable when the engine speed is increased to say 20 to 30 miles to the hour. There is no rule that will apply to a loose camshaft-bearing knock, but they differ in sound as they have a sort of a rattling sound at all speeds.

When Engine Is Sluggish and Fails to Develop Power as It Should.

There are a number of causes for the engine acting sluggishly and not developing the power it should. Possibly the two most important things affecting power are improper adjustment of the carburetor and the retarded or advanced spark—more particularly the retarded spark.

In case the fuel is over-rich, the engine will run but seems to work like the brakes are partly set and a black smoke will be emitted from the exhaust. On the other hand, in case the mixture is weak, the engine will not have the power and there will

be a snapping and popping in the carburetor manifold. This can be corrected by readjusting the needle valve.

A very good way to adjust the carburetor is to set the spark in running position and place the gasoline control lever where the engine will run say six to ten miles per hour. Commence the needle valve adjustment, and set it where the engine runs smoothly and freely. Open the gasoline suddenly, with the spark retarded, and if the setting is correct, the engine will gather quickly and evenly.

Should it snap and pop once or twice before it takes the gasoline, it indicates, in nearly every case, an over-lean mixture and the needle valve should be opened a trifle and the test repeated.

Leaky valves and worn or broken piston rings will also affect the power, but can be detected by turning the engine over slowly with the ignition off. In case the rings are at fault, the compression will be heard going past the pistons to the crankcase with a sort of a hissing sound while, if the valves are at fault, the hissing sound will appear at either the intake or exhaust manifold.

An over-supply of cylinder oil in the crankcase will also prevent the engine from being as flexible as it should be. This trouble can be easily located by trying the test-cocks in the case, as well as by the white smoke that will pass off at the exhaust when the engine is running.

In case the timing gears are improperly set, the engine will act sluggish, owing to the burned gasoline not being expelled from the cylinders before the new charge reaches them.

In case the valve tappets are too long, not allowing the valves to seat properly, the engine will fail to develop the rated power. Care should be taken in making the adjustment, for the adjustment may seem to be correct when the engine is cold but as soon as it is hot the expansion of the metals will cause them to ride sufficiently to allow compression to escape through the manifold. This will affect the incoming mixture in case it is past the intake valves.

Irregular Action of Engine.

By "irregular action" we refer to any irregularity of the running. It may miss fire, backfire, slow down, etc. Any irregularity of running can usually be traced to some of the already mentioned causes. Overheating, of course, not only causes the engine to run irregularly, but it affects the power of the engine, causing it to run very much like the brakes are partly set.

In case the engine has a cut-out in the exhaust line, it can be used at this time to good advantage. When the engine is over-heated the exhaust will lack the snap and pep it should have; that is, it resembles a late spark. Should the spark be retarded to where the engine runs along slowly when it is working at normal tem-

perature, the engine is suddenly stopped.

A stoppage in the water system will cause the engine to become overheated and the result will be a loss of power. Many times the inner walls of the hose connecting the radiator to the engine will break off in large pieces—almost if not entirely stopping the passage of the water—in which case the engine will heat up very quickly.

The water system should be thoroughly washed out from time to time, and the interior condition of the hose connections looked after. The small pipes in the radiator may become partly clogged from scale, etc., preventing the heat from radiating away, and the engine will overheat.

The slipping, or loose fan belt will allow the engine to overheat, especially in case the car is being driven with the wind. As already mentioned, a late or retarded spark, over-rich mixture, too much or a low grade of lubricating oil, dragging brakes, dirty engine, etc., will cause the engine to overheat and lose power.

SOME SHOP NOTES FOR THE REPAIRMAN.

(Concluded from page 14.)

the usual chocolate color appearance.

When you are satisfied that the plates are clean, they should be removed from the soda solution, well washed, replaced in the sulphuric acid solution in the cell and the charging continued until gassing begins. This treatment has often raised the efficiency of cells from 25 to 75 per cent. Six hours' charge should be sufficient.

In these days when battery repairs are being done by practically every garage-man, a hint as to what kind of bench should be used may, perhaps, be helpful, as everybody knows the acid used in a battery is very powerful and will, in time, destroy an ordinary wooden bench. To overcome this, the bench should be covered with sheet lead and graded slightly so that the acid as it drains from the battery will be carried to one corner where a hole is cut in the bench. A lead pipe is led from this hole to a large earthenware receptacle underneath the bench where the acid is caught.

Another type of battery bench, which will be found serviceable, is made by cutting a square hole in the top of the bench slightly larger than the largest battery. This hole is covered with a grating, and a lead-lined tank, with an outlet for draining the acid, is placed underneath.

A nut which has become rusted in place will often resist the ordinary methods adopted for removal, and other methods have to be employed. A good method for removing such a nut is to heat a large nut that will fit over the stiff nut and let it rest around it for a few minutes.

The heat will usually expand the nut without producing expansion of the bolt, and it may be unscrewed. Kerosene may be poured around the threads with good effect. Several alternate heatings and ap-

plications of oil may be necessary before the nut is loosened. A light tapping with a hammer on all the facets of the nut will help to loosen it on the threads.

A tin of black Japan is most useful in the garage, particularly with a new car. It is sufficiently liquid to hide brush marks, but dries so quickly that if thinly applied it will not run into blobs. A one-inch hat oil brush and a small water color brush for touching out minute chips on wings, if these are black, should be used.

There are generally small plated pieces on most cars that cannot be polished, and some plated butterfly nuts that are of such poor quality that the rust comes through.

A little thought will easily decide what parts are best painted over, but a few typical places are name plate and butterfly nuts on the accumulator box; all armored electric cables, except the last length to the lamps, if these are plated; name plates on black lamps; and the whole of the tail lamp, if brass or plated, as it is impossible to keep this polished. If black, the change-speed lever, brake lever, and pedals will be improved by receiving a coat.

A new chassis is often very roughly painted, and patches of rust will appear after the first wash, if not before, especially on odd bolt heads. These should be painted over, while a thick coat applied to the thread of any chassis bolt from which the nut is likely to jar loose after the latter has been screwed up, is often as good as a spring washer.

Looking Into the Cylinder of a Gasolene Engine in Operation.

The first tool used by the investigator is usually the eye. He sees a thing happen and the first step in his investigation is likely to be the obtaining of a telescope,

LABOR, CAPITAL AND REFORM.

Labor needs a few headaches to understand capital, and capital a few backaches to understand labor, while reform needs to get its hair cut to understand either.—Irving T. Bush.

microscope or something to enable him to see more clearly.

In the development of the internal combustion engine, however, visual observation of the combustion has played a minor role. To be sure, early investigators did provide apparatus that permitted them to look in the cylinder while the engine was operating, but little has been done in this direction with engines operating at the high speeds of the present day automobile types. Interest has centered in what an engine could do rather than how it did it. As a result, measurements of brake horsepower and fuel consumption have been deemed of first importance.

At the present time, the cry for fuel conservation has re-awakened interest in the nature of the combustion in the cylinder. Glass induction systems have disclosed how satisfactorily—more often how unsatisfactorily—the fuel has been prepared for combustion. Analyses of the exhaust gases have shown how completely—more often how incompletely—the charge has been burned.

Admitting that it is important to study the preparation of the fuel for combustion and the results which are evident after it has taken place, an actual study of conditions during combustion should surely be worth while.

This has been accomplished in connection with the study of combustion in the one-cylinder Liberty engine at the United States Bureau of Standards in Washington, D. C., in the following manner.

A spark-plug shell has been adapted to receive a circular section of glass intended to serve as a window in the cylinder. This assembly can be used in place of either spark-plug in the ordinary aviation cylinder, but in this instance an additional boss has been welded to the cylinder in order that conditions might be observed with both plugs firing.

Its use was satisfactory in that changes in flame color due to changes in air-fuel ratio were easily discovered. Since the entire combustion stroke is completed in 1/16 of a second at an engine speed of 1800 r.p.m., it is possible to see only the predominant color of the cycle by this means.

To make it possible to observe the combustion in its various stages, another device, a stroboscopic disk, was added. Its purpose is to permit the combustion to be observed during only a small portion of the stroke. Since there is one power stroke for every two revolutions of the crankshaft, this disk is driven at one-half crankshaft speed.

The flame is observed through a slot in the disk, the length of the slot governing the length of the portion of the stroke studied. Provision is made for altering the angular relation of this slot to the crankshaft so that any interval of the cycle and, hence, any stage of combustion can be studied.

Observations made possible by this apparatus are not likely to replace any of the more usual measurements. They may, however, prove, and in fact have proved, of considerable value in research work of the nature described by permitting observations of the duration of luminous flame during the power stroke, the characteristic differences in color and brightness at different phases of combustion and their variation with changes in ignition timing, mixture ratio, compression pressure, etc.

One observes, for instance, excessively bright flashes of flame of extremely short duration accompanying the phenomenon known as fuel knock or detonation. The cause for this phenomenon is, of course, not revealed by usual observation.

Welding, Cutting and Brazing Practice

Welding Is Not Practicable in the Case of a Broken Malleable Casting Because of Weakness of the Weld—But an Entirely Satisfactory Repair May Be Made by Brazing—The Method of Procedure Described

By David Baxter

A large percentage of the automobile castings are made of malleable iron; that is, these parts are what are known as malleable castings, since they are cast in molds the same as gray iron, brass or aluminum castings. The metal mixture of which the malleable castings is made, however, is different from any of the other metals in that it is brittle and almost worthless when first cast—that is, the original casting is not fit for much.

Subsequent to the casting process, the malleable iron article is annealed for a given period of time to impart the tough, malleable quality. When remelted, this annealed metal loses its malleable quality to become again the brittle white iron, which cannot be machined and has little strength and is not to be relied upon under a strain.

Since strength is the purpose of making malleable casting, it is of little use after it has been remelted, because malleable castings are of very fragile design compared with other castings required to bear the same stress.

It is this peculiar characteristic of malleable that causes trouble for the torch operator when he attempts to weld it. In fact, there is no system as yet known by which the welding process can be satisfactorily applied. Even re-annealing appears to have no beneficial effect; neither does the piling up of surplus metal along the weld give the needed strength to the bond.

The condition and manipulation of the welding flame makes no difference. The flame may be absolutely neutral and manipulated with the greatest skill, and still the weld will be weak and brittle. If the malleable casting metal is melted under any known condition, it will change to white iron.

The strength or weakness of the weld depends upon the amount or depth of the melting but, where only a shallow weld is made, it still has the inherent weakness of remelted malleable in the part melted.

From these facts it would seem that it is useless to weld a broken or cracked malleable casting. Such is the case, because in making a fusion weld the malleable must be melted with the results mentioned. However, the welder need not despair, since there is a method by which he can repair this kind of casting. The results of such a repair will be quite satisfactory, too.

This work is done with the welding torch, but it is not, strictly speaking, a

fusion weld, since none of the malleable metal is melted. Of course, some welders do melt the barest skin of the casting surface, but in accordance with the theory just described the bond will not be as strong. Probably the most scientific method is to heat the surface to the melting point or just below it. Then, when the filler metal is added, there is no brittle layer of metal to weaken the bond.

This method is what is known as brazing. The broken parts are not welded, but are merely brazed. In a fusion weld the casting and filler metal flow together and become one, while in brazing the filler metal is only adhered to the surface of the casting. In brazing, however, only brass or bronze filler is used.

This preserves the redeeming quality of malleable, insofar as the welder is concerned. The brazing metal will stick to the malleable quite readily, but it is difficult to make it adhere to cast iron. Another good point is that the brass or bronze filler will adhere to steel with almost equal

to oxide or will burn it up. If the dross thus formed is not removed, it will be trapped in the bond so as to render it weak and porous. Once the bond is impregnated with oxide, it is difficult to remove the effects. The best way is to prevent the oxide from forming.

One of the surest methods is to keep the flame neutral, but that is not all, as the size of the flame must be considered. Too large a flame tends to oxidization. It supplies a heat which is too intense, making it difficult to prevent burning the filler.

A proper manipulation of the flame helps to prevent oxidizing. Even the right size flame will oxidize the bronze if held motionless in one spot too long. Holding the flame too close to the melting tends to inject oxygen into the metal, especially if the flame is held motionless for some time.

This does not mean, however, that the flame should be constantly jerking and sawing across the melting metal. It means that the flame should be moved according to the melting condition of the filler—advanced or drawn back a little as the melting metal requires.

Therefore, a neutral flame of proper size, correctly handled, is the safest one to use on a brazing job. A flame which is a trifle larger than that for the same weight job in other metals is employed. This is because larger quantities of filler are handled than would be the case if steel or cast iron filler were used.

The welder must cover a greater area than would be the case if he were welding instead of brazing. Some operators use a flame carrying a slight excess of acetylene, claiming they can cover more surface with less danger of burning the filler because the flame temperature is thus reduced.

In conjunction with a larger flame, it is advisable to use a larger filler rod than would be the case in ordinary welding; that is, the diameter of the rod used for brazing should be greater than for welding the same job because a larger quantity can be deposited more quickly. Besides, there is less danger of oxidizing.

Whatever the size of the rod, if it is to be manipulated to the best advantage, it should be on the verge of melting by the time the surface of the malleable is at the right stage of heat. It should be laid quickly and deftly the moment the malleable is ready to receive it. A twisting movement helps to spread the filler over the heated casting. In conjunction with

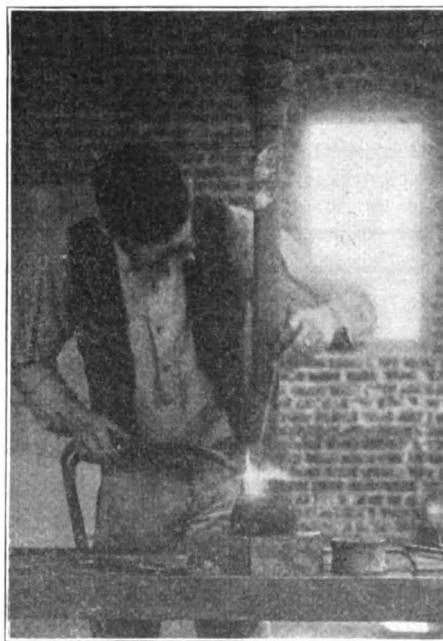


Fig. 1—Brazing a Heavy Fillet Around the Tube at the End of the Casting.

facility and tenacity, and malleable and steel are often found in connection with each other in automotive construction.

In brazing malleable castings, or malleable to steel, a strictly neutral flame is essential because the bronze filler oxidizes so easily. An excess of oxygen in the welding flame will turn some of the bronze

the force of the flame, this lends a neat appearance to the bond.

Brazing flux powder should be used at frequent intervals on every brazing job. The handiest way to apply it is by dipping

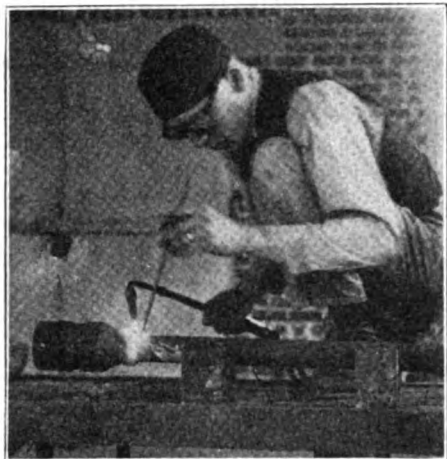


Fig. 2—Housing Arranged in V-Blocks to Turn Easily Keeps Brazing on Top Side.

the melting end of the filler rod into a pot of the flux. Enough of the powder adheres by melting to the rod to flux a certain portion of the bond. When deposited, the powder melts and coats the brazing metal, thus protecting it from the oxygen of the flame and atmosphere.

Pre-heating, or heating the job previous to applying the flame, is eliminated from the brazing process. First, because the expansion and contraction are so insignificant that they need not be considered, due to the ductile nature of the malleable. Second, it is eliminated because most malleable jobs are too light to require pre-heating to facilitate the melting, even where the surface skin is melted. The doing away with this bothersome process makes brazing a preferable job to the welder and he will often braze a job on this account.

On the other hand, a brazed job does not require slow cooling, as is the case with so many welding jobs. The casting is ready for use almost as soon as the bronze filler is set; provided, of course, there is no machining or filling. The operator does not have to swathe a brazed job in asbestos paper or other cooling devices to make it cool slowly. Brazed malleable automobile castings are cooled in the open anywhere.

Grooving is essential on malleable jobs that are to be brazed, about the same as on other jobs that are to be welded: that is, the depth and extent of the grooving is practically the same. Still, it might be better to advise a little more grooving where the job is to be brazed than where it is to be welded, on account of the brazing being merely an adhesion. Therefore, a wider groove will offer more surface to which the filler may adhere.

The cracked or broken edges are cut or ground back sufficiently to form a groove

about twice as wide as the thickness of the metal. If the metal through which the crack runs is a quarter of an inch thick, the groove should be half an inch wide at the top and should slope to the full depth of the metal thickness.

This is a rule that holds good only up to a certain limit on welding jobs, but may be followed verbatim on malleable iron brazing jobs, because there are no very thick malleable castings in automobile construction.

Cleanliness is another factor which is important in welding and brazing alike. The surface of the casting along each side of the fracture should be thoroughly cleaned of all dirt, rust or other non-metallic substance. These things will interfere with the adhesion the same as they would with fusion. It is advisable to scrape the surface until the bright bare metal shows. If grease, enamel, etc., is first burned to a cinder with the welding flame it will be more easily cleaned.

Another similarity of welding and brazing is that the part to be brazed should be arranged so that the filler metal can be applied to a surface as near horizontal as possible, since brazing metal tends to overflow portions of the castings that are not yet ready to receive it. This causes weak spots in the adhesion.

The casting should be maneuvered to keep the brazing on the top side as much as possible. Where this is impracticable, the welder should melt less filler and endeavor to keep it from getting too fluid. The brazing metal is then piled on in lumps or ripples, the flame being drawn back each time the metal is deposited, so as to give it a chance to congeal before adding more.

Let us take some specific examples and see how the brazing process works out in detail, as it applies to malleable castings, and also where malleable connects to steel. The latter is well illustrated in Figs. 1 and 2.

This example was a drive-shaft housing, with a steel center tube having a malleable casting attached to each end. Both of these castings had worked loose in service, so that it was necessary to braze them to prevent future trouble. The brazing was accomplished as follows:

The first step was to clean around the ledge formed where the tube entered the malleable casting. This was accomplished as has been suggested. The end of the casting and the adjacent steel were heated and scraped bright and bare. Then, as it was unnecessary to heat the job previous to brazing, and was also unnecessary to keep it hot during the brazing, no preparation was made for this; nor was it necessary to prepare in advance for taking care of expansion afterward. So, the first thing after cleaning was to place the job in the handiest position for the work.

No grooving was employed, as the corner formed by the tube and casting was

sufficient for the purpose. The drive-shaft housing was placed in the position indicated in Fig. 1. This illustration also shows the torch in operation while applying a fillet of bronze around the tube at the end of the malleable casting.

A medium size tip was fitted to the torch and the flame lighted. When its condition had been adjusted to neutral, this flame was applied to the corner of the casting as shown in the illustration. Here, with the tip of the white cone licking the metal, it was played back and forth and around over the steel tube and the malleable casting, heating perhaps an inch high on the tube and all of the top surface of the casting.

The flame was also given a tiny circular motion at times. While this was being done, a quarter-inch rod of bronze was brought close to the flame so that it would be heating gradually. When a spot probably an inch in diameter, partly on the tube and partly on the casting, reached a bright red stage the flame was played upon an inch of the filler rod to cause it to melt and settle upon the heated spot.

At the same time, the pressure of the flame was utilized to guide and spread the molten bronze. The rod was also used to guide or press the molten filler into the corner, where the flame force and filler rod were both manipulated to round out the fillet and give it a more solid appearance.

Meanwhile, the flame was gradually working toward a new portion of the corner, where the first procedure was repeated after dipping the red-hot end of the filler into the brazing flux to carry a quantity of it to the casting, where it melted and spread out over the surface.

As the flame gradually moved around the tube and heated another portion of the

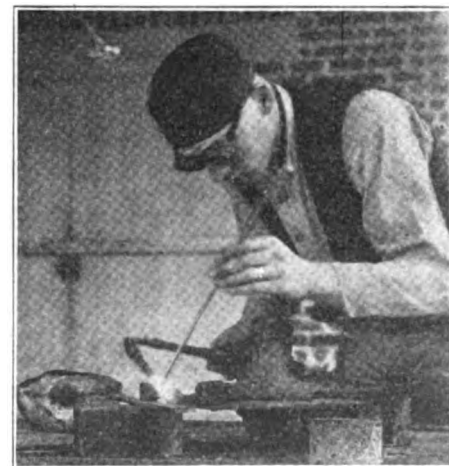


Fig. 3—The Broken Part is Blocked and Leveled Before Applying Brazing Metal.

corner to a bright red stage, it was quickly followed by the filler rod so that both would be ready at the same time. At no time was the filler permitted to drip, but was fed over the heated spot by direct contact.

Thus, a heavy filet of bronze was deposited entirely around the tube, adhering to both the steel and the malleable. In this the torch operator was careful not to melt the malleable, but to swing the flame away the moment the melting point of the metals was attained and then to bring it back again almost instantly to finish applying the filler. He then shaped it into a neat-appearing, well-rounded filet.

When this work was finished, the housing was allowed to stand a few minutes in order to permit the filler to congeal. Then the housing was placed in a pair of V-blocks, as indicated in Fig. 2. This arrangement was for the purpose of permitting the welder to turn it easily and, at the same time, prevent it from rolling unexpectedly.

In order to keep the brazing on top or nearly horizontal, the housing was turned as the melting progressed. Thus, there was less danger of the molten metal flowing over part of the bond before the surface was fully heated.

The brazing of this joint was practically the same as at the other end of the housing. This casting was also malleable iron and was fastened to the steel tubing in a series of ripples, shaped into a filet around the tube by the flame pressure in connection with a deft movement of the rod. No attempt was made to fuse the bronze with the malleable or with the steel.

It was merely adhered to both by the same process of bringing the metals to a bright red, near the melting heat, and then spreading the fluid filler metal over the heated portion. Turning the housing with each application, the filet was made an inch at a time entirely around the housing.

Sometimes, either or both ends are broken off or cracked part of the way around. Usually, the steel tube at the end of the casting is broken. In either event, the fracture is beveled or grooved out before applying the brazing metal. It is a good idea to drive a short section of gas pipe inside the tube—a section long enough to extend a couple of inches on each side of the fracture.

This piece of pipe will not interfere with the drive-shaft, as there is plenty of clearance inside of the tube. It strengthens the tube and furnishes a solid backing for the brazed joint. Black pipe, 1½ inches in diameter, is about right for the housing illustrated. It should be ground or filed clean and bright on the outside before inserting it into the housing tube.

The next example of repairing broken malleable is the one which forms part of the brake rigging illustrated in Fig. 3. This casting had one of the small projections or arms twisted off, the location of which is indicated in the illustration. The twisted corners of this fracture were put in alignment by hammering. Then the metal was cut away on each side of the break to form a V-groove. Next, the part was ar-

ranged upon the welding table as shown, with the small piece blocked-up level. The operator was careful to obtain a good alignment.

In this job the work was more in the nature of a weld, except that the malleable iron was not melted. The groove was built up with filler bronze about the same as a weld by carefully melting into the preceding applications, each layer being but a continuation of the preceding one.

The last layer was well-rounded and smoothed over with the flame pressure. The layers were made a bit at a time, and stirred in with a twisting movement of the rod. A liberal supply of flux applied in the usual way assisted the mixing.

First the tip of the flame was gently applied along the bottom of the groove and, when this turned red, the brazing filler was deposited from a quarter-inch rod. While the pressure of the flame floated this deposit, the hot end of the rod was dipped in the flux. Bit by bit, the filler was fluxed and adhered around the knob the full length of the groove.

Thus, in all malleable repairing, it is seen that the chief essential is adhesion and not inter-fusion.

BOOK REVIEW.

THE MODERN MOTOR TRUCK. The Design, Construction, Operation, Repair and Commercial Application, by Victor W. Page. 1,000 pages, 6 ins. by 9 ins., 528 specially-made illustrations. Price \$5. Published by The Norman W. Henley Publishing Co., New York.

The new impetus which has been given to the motor truck industry in view of the prospective development of nation-wide hard road projects, thus making long distance hauling by trucks a practical certainty in the near future, makes this new book appear a particularly timely and valuable publication.

It considers all types of motor trucks and industrial tractors and trailers, outlining features of all types of trucks, gasoline and electric, and all varieties of truck bodies.

The book is written in language that everyone can understand and is not in any sense of the word a technical treatise. It is a practical book which will make a special appeal, it is believed, to the truck driver who seeks to better his position and to the mechanic charged with the repair and upkeep of trucks.

To the factory or business executive who wants to obtain a complete working knowledge of truck operation problems, this book will be of great value, as well as to the truck salesman or automobile dealer.

The engineering and service departments of all the leading motor truck manufacturers, it is stated, have co-operated with the writer and have furnished material on truck construction and design. The vol-

ume not only details the design, features and construction of all types of gasoline and electric trucks, but it gives explicit instructions for the repair and upkeep of every part.

All forms of truck chassis are shown with all component parts clearly outlined. Numerous sectional, disassembled and phantom views show all features of truck construction, which is simplified and explained in a way everyone can understand. Instructions for systematic inspection and lubrication of motor trucks are given; as well as comprehensive instructions for making repairs to engines and auxiliaries.

To show how all recent developments are described, there is a discussion of the pneumatic-tired truck and six-wheeled forms; also a complete outline of electric starting and lighting systems, metal and cushion wheel forms, convertible bodies, etc.

Complete driving instructions are given for the latest designs. All labor and time-saving methods of truck loading are illustrated and all types of special purpose bodies are shown.

There is a complete exposition on the use of tractors and trailers and a chapter on the figuring of truck costs.

The 16 chapter headings are as follows: motor truck types; the motor truck power plant; motor truck fuel and carburetion systems; truck motor cooling and lubrication; the motor truck electrical system; motor truck clutch and gearbox; motor truck drive systems; motor truck chassis parts; motor truck loading and operation; special truck applications and body designs; road troubles and truck maintenance; gasoline truck repair and adjustment; the electric truck construction; construction, care and charging of truck batteries; driving and maintenance of electric trucks; and truck operating cost determination.

Bureau of Standards Investigates Brake-Lining Materials.

The safety of automobile travel depends largely upon the ability of the brakes to stop the car within a short distance or hold it on the steepest grades which it may be called upon to negotiate.

To accomplish this, the brake-lining material must possess a sufficiently high and uniform coefficient of friction and must be capable of withstanding much more severe conditions of load and temperature than are ordinarily experienced, in order that it may not fail in an emergency.

An investigation of the properties of commercial brake-linings, undertaken some months ago by the United States Bureau of Standards, has developed some very interesting and important facts concerning these materials. Standardized methods of tests have likewise been adopted by the bureau.

Safe Light—No Glare—Intent of Law

Law First Said "Stop Your Glare" but Found the Public Interests Demanded that It Add that Light Must Be Safe for Driving Behind—New Laws Define Glare as Well as the Minimum of Light Which Is Required

By Robert Livingstone

Since our July issue went to press, two additional states have recognized the menace that motorists, who drive with insufficient light or who let their headlights glare, are to themselves and other users of the road. They have announced headlight regulations in conformity with the specifications established by the Illuminating Engineering Society. These states are Iowa and Ohio.

California, Connecticut, Maryland, Massachusetts, Nebraska, New York, Pennsylvania, Utah, and Wisconsin already have laws that are almost identical. A dozen or more other states have laws, the intentions of which are good and which are being enforced with more or less regularity.

The earlier laws used to say, "Stop your glare." They let it go at that. That was before science had taken a hand and demonstrated that, in order to have a law that was to the best interest of the public, it was necessary to add: "You must also have a light that is safe for you to drive behind."

The early laws were not enforceable because they did not define what constituted glare, but left it up to the driver, and the policeman who attempted to arrest him, to argue the matter out. The result was that the judge usually said that one man's judgment was as good as another's, and dismissed the case.

The new laws define glare, and also the minimum of light required in much the same way as the Volstead act defines the amount of energy that may be legally included in beverages. The definition of lighting requirements is stated in terms of apparent candlepower, as measured at a point 100 feet ahead of the car—and this candlepower can be as easily measured as the voltage of a battery.

It is not necessary, however, that every policeman who attempts to enforce the laws should be provided with a device for measuring candlepower. The state usually makes tests of the various lenses that are on the market and publishes a list of those that will comply with the law, together with a statement of the conditions under which they comply: that is, the maximum-sized bulb that may be used, the focal position of the bulb—which is important because it varies with different makes of lenses—and the tilt of the headlights which is required.

Unfortunately, however, the state does not warn the public against lenses which are inefficient from the standpoint of light-

ing the road. The laws require only a light sufficient to show objects 200 feet ahead—less than a short city block—and almost any lens will give that much light.

On the other hand, the laws permit as much light as the driver wants, provided it does not glare, and the driver is intelli-

Develop Those Latent Possibilities.

Almost every man has undreamed-of possibilities. If something hits him in the right spot, if his ambitions and energies are unloosed, he will quickly discover these possibilities. Otherwise he may pass through life in an easy rut, never tapping the great reserves within him. Men who pay wholehearted attention to business, who train themselves, who develop every power to the full, are favored by the ill-training of the average man.—Darwin P. Kingsley, president New York Life Insurance Co.

gent enough in his choice of lenses to get a lens that will give a good driving light. The law merely says that certain lenses are legal, and that others are not, leaving it up to the user to investigate and find out for himself which of the lenses are desirable to use.

There is really as much difference between the various makes of lenses as there is between different makes of tires. One lens may be suitable only for slowly-moving vehicles as it may, even when using the largest bulb that the law permits, give barely the minimum of light required to let the driver see 200 feet ahead.

Another may give far better light than plain glass which, being so commonly used, is the usual basis for comparison. Unless one is an expert on the subject of illumination, it would be impossible to tell which was which by reading the advertising or by inspecting the lenses themselves. Both lenses are round and are designed to go into the front of a headlight. They look about the same.

The manufacturers both claim, and correctly too, that they are legal. But that is where the similarity ends. It is up to the dealer to make careful driving tests and decide for himself which he wants to recommend to his customers. It is much easier to sell a lens which is an advantage for the motorist to use—even if there were no law—than one which spoils the driving light. Choose carefully.

Having chosen the make of lenses that will be sold, it is up to every dealer to

plan to make the most of the merchandising opportunity, aside from the sale of lenses which the laws have created.

Suppose that the law had read: "Everybody must wear a straw hat." Do you think for a moment that your clothing merchant would sit back and wait for the police to round up customers for him? Not on your life. He'd get busy and advertise the benefits of wearing a straw hat. He'd fill his window with hats. He'd let the world know that he was official headquarters for the best straw hats that could be had anywhere.

And when a customer came in to buy the hat he had seen advertised, would the clothier stop there? Certainly not! He'd tell the customer what a fine line of Palm Beach suits he had, and soft-collar shirts and light underwear. When he was all done, in nine cases out of ten, the sale of the straw hat would be the smallest part of the whole sale.

A headlight law creates a very similar chance for the accessory merchant to boost his business. First, he should pick out a line of lenses that has good talking points besides "legality." Next he should make these talking points sell lenses. Next he should take advantage of the customer's presence in his store to show and sell other articles.

Then there is the service feature, and there is more profit there. Some dealers have made the mistake of selling lenses simply as so much glassware—either turning them over to the customer in the original package, or installing them in the headlights without making the proper adjustment, which latter is absolutely necessary to make the light legal and comfortable for driving.

An adjustment of lenses should be treated exactly the same way as the adjustment of a set of brakes after the brake lining has been installed. No dealer would think of relining the brakes and not adjusting them so that they would work. Nor would he think of accepting the profit on the brake lining itself as the entire profit on the transaction. He would make a profit on the lining and he would make the usual service charge for installing it correctly.

This applies as well to lenses. An adjustment at the start and then at regular intervals not only means profit to the dealer but satisfaction to the customer, better driving light, and freedom from annoyance by the police.

Glimpses in the Garageman's World

Southern Illinois Garage Presents Good Example of Service and Efficiency
—Repair by Contract Is Profitable for Oregon Dealer—Massachusetts
Garageman Builds Garage Exclusively for Women—"Live Wire" Advertising

For a Ford? This Garage Has It!

It's just a little old Ford, that car of mine—folks at home say I have no business to call it a "car" at all. Just the same, I haven't started to any place yet in it that I haven't gotten there safely and in pretty good time at that.

But I will have to admit that this last trip I thought I wasn't going to make the goal. I was headed for St. Louis. Everything was lovely—the roads and the weather were great. And I sailed along in the little Ford as happy as a kid turned loose from school. I laughed as I remembered Bob's final warning:

"You're going to get fooled this time, old chap. You won't make it in that rattle trap."

Then, about 15 miles from Cairo, Ill., the fun began. First, I had a blowout. Had an extra tire, but it wasn't in very good shape and I didn't feel too sure I'd be able to make Cairo with it, but I put it on and drove ahead.

Then the engine began to balk, and other troubles followed that I couldn't locate. I'll tell you I was beginning to think Bob was right. When I pulled into Cairo, I was about ready to sell the old "boat" for junk and take the next train back home.

I asked the first fellow I saw to direct me to the nearest garage. He hesitated a moment, and then replied:

"Well, it isn't really the nearest, but if I were you I'd go to Leo McDaniel's garage. If you want real first-class service, you'll get it there, and you can't name a Ford part that he can't supply."

I followed his advice. Say, that fellow certainly did know what he was talking about! McDaniel has a place any town might be proud of. I knew the minute I drove up to the front and saw the spic-and-span, up-to-the-minute look of the place that I was going to come away with a car in good shape if it could be made that way. And I did.

While I was waiting, McDaniel, in answer to my questioning, told me something about this new and modern garage of his.

The building was only recently completed and is 200 feet long by 75 feet wide,

having a storage capacity for 66 cars. Besides, he has a well-stocked accessory store where he carries a complete line of all the popular brands of tires and tubes and, he believes the most complete line of Ford ac-

No wonder McDaniel is prospering. He couldn't keep business away from a place like that, and, taken with the kind of service he gives, it makes a combination that can't be beat. My experience proved that.

McDaniel? Oh, he's a live wire. Believes in publicity of all kinds—that is, the right kind—newspaper, signboard and word-of-mouth publicity, and he lives up to the good impression it creates.

Repair by Contract Impossible? Try It!

The seemingly impossible has been achieved!

What service shop is not familiar with the indignant customer, who stutters, stammers, and rages when he gets his bill for repair work? He accuses the shop of robbery, graft, sabotage, and other crimes.

"What! \$85 for that little repair job? You'll have to itemize it and show me every blessed thing that went into the car. I don't believe it took half so long to do that work as you claim. I have half a mind to leave the car here and let you keep it,

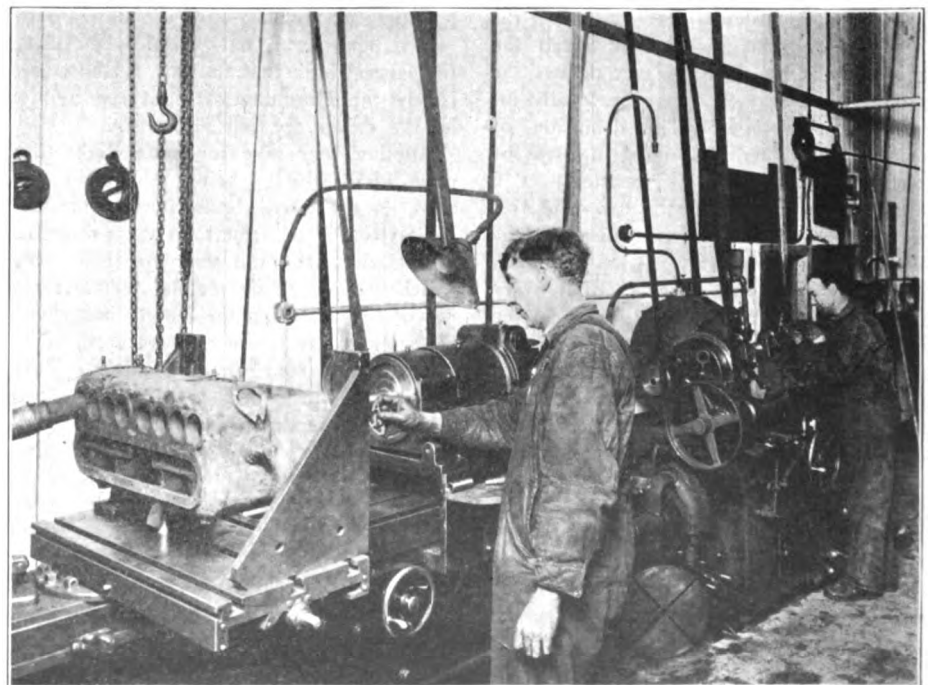


McDaniel Garage, Cairo, Ill., Specializes in Carrying a Complete Line of Ford Accessories and Parts.

cessories carried in Southern Illinois.

Then there is a tire service station, which affords free road service to tire customers which, of course, is popular.

There wasn't a detail of that entire building that was not modern and complete.



Cylinders Ground "While You Wait" in the "Repair by Contract" Shop of Cook & McGill, in Portland, Oregon.

rather than pay such an outrageous price for repair work!"

Such occurrences are not rare, and it remained for a Portland, Ore., automobile dealer to overcome this vexing problem.

Repair by contract, is the answer.

"Impossible!" many exclaim. "Too much guesswork. No one can tell how much work is going to be installed until he actually gets to work on it," is the contention of many. Read here how Cook & Gill have not only overcome this ugly phase of repair work, but are making more money at it than ever before!

The heads of the firm reasoned that it was not impossible to do repair work by contract. They determined to keep an accurate record of each and every individual operation in repair work, to keep this record up for a long period, and then to work out a scale of time for each operation of repair work.

After three years of accurate record keeping, a thoroughly consistent scale was reached, and experimental contracts proved profitable and satisfactory to all concerned.

The customer for repair work today is referred to the superintendent of the shop. His car is looked over carefully and, by use of the scale, a contract price is made for the work.

Complete satisfaction is assured the customer at every phase of the deal, not only through the efficiency of the contract system but for the speed with which the finished bill is rendered.

As each piece of work on the job is completed, the time slips and material slips are rushed to the office through an electric conveyor, and within five minutes after the job has been completed, the invoice is ready and all costs distributed on the copy retained in the office.

Owing to the fact that the work is contract work, it is unnecessary to furnish the customer with an itemized list of materials used.

Builds Garage Just for Women.

The rapidly-growing number of women motor owners and drivers has led John F. Fleming, of Brookline, Mass., to conceive

of a novel if not unique idea of opening a garage exclusively for women.

The establishment will be managed by a woman, and there will be women attendants and mechanics throughout. Even the cab service to be operated in connection with the garage will have women drivers.

The garage is to be located in a three-story fireproof building owned by Fleming at 50 Washington street, Brookline. During the summer Fleming will fit out the building with the most up-to-date garage equipment and put into operation a number of original ideas for the convenience and comfort of women car owners. The garage will have the appearance of an automobile club for women, with every means for the careful handling and maintenance of the various cars they drive.

For the woman whose only interest in her car is to have it always ready for use, the woman's garage will send a cab to her residence for her, and when she reaches the garage her car will be ready to drive away.

When she returns, if she wishes, a cab will take her home. And between the drivers, the car will be washed and made ready for the next trip. The cab service and the individual attention given the car will be listed separately from the monthly storage rate.

The building is well lighted and fitted with private lockers, so that the woman who wishes to care for her own car can take her overalls and do any work on it she pleases. There will be trained assistants at hand to help on any job she does not care to undertake alone. Fleming says that the one inflexible rule is that there shall be no tipping of employees.

It being the intention to allow plenty of space for each car, the garage will accommodate not more than 40 cars. No transients will be taken. There is to be a large automobile elevator connecting all floors. Only signs of entrance and exit will be placed on the exterior of the building.

The front of the building on the ground floor will be fitted up as a lounge or waiting-room for the patrons.

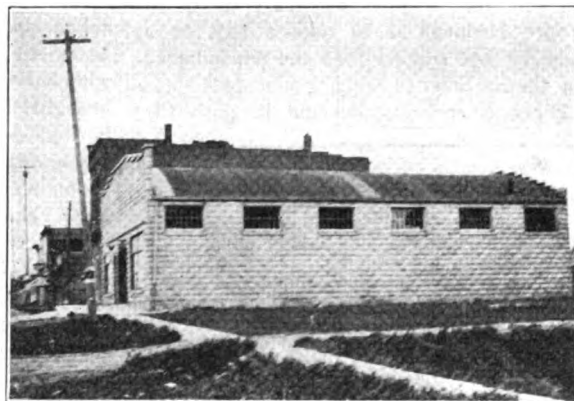
"Live Wire" Advertising.

When the motorist reaches any point ten miles from Oelwein, Iowa, he knows it and also knows that Warneke Bros. have a service station there. When he has gone a mile farther, he knows he is now nine miles from Oelwein, and again has it impressed upon him that Warneke Bros. have a service station—and so on at eight miles, seven miles and down the scale to one mile.

Every road leading into Oelwein has large road signs, similar to the one shown

in the illustration, at mile intervals, beginning with ten miles.

It is the kind of roadside advertising that is not offensive, for it is really helpful to the motorist as he speeds along the highways and obtains his exact bearings.



Unusual Placing of Windows Gives Light and Ventilation.

It is advertising that is impressive, and the kind that will be read and absorbed by everyone who drives along the road.

It is needless to say that Warneke's garage is a popular and busy place. You'd know that from their live-wire kind of advertising. Efficiency in advertising seldom, if ever, fails to be the sign of efficiency in general management of an automotive service station.

Unique Window Arrangement a Feature.

There's a very good reason why the motorist traveling along the Burlington Way up in Minnesota should breathe a sigh of relief when he drives into the village of Fountain, Minn.

And that reason is the attractive, up-to-date garage of Lundy Bros., which you see in the illustration. He knows, just by seeing the modern, good-looking exterior of this establishment, that here is a place where he can count upon receiving prompt and efficient service if he requires it.

Built of cement block, Lundy's garage is particularly conspicuous because of the unusual placing of the windows, which gives ample light and ventilation.

Why Not a "Bargain Day"?

The big department stores realize the advantage of "bargain day" and I have often wondered why automobile folks don't take a hint. Why not have one day a week for bargain day and on that day sell some particular accessory or tool at a reduced price?

A man will often buy a thing at a reduced rate that he might not buy otherwise in a dozen years. Then, too, after a fellow is once in the store, it is up to the clever salesman to get him interested in other wares.

And a catchy display always attracts. Why not try something like this too:

"FRIDAYS ARE ALWAYS GOOD FRIDAYS WITH US—If you break down on any Friday in the year anywhere, we'll haul you in and fix you up at 20 per cent discount."



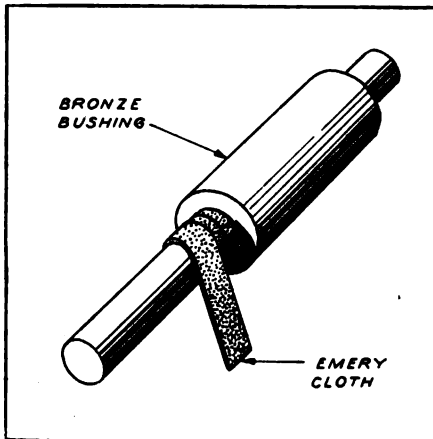
"Milestone" to Oelwein and Warneke's.

Practical Hints for Shop Mechanics

Fitting Bronze Bushings.

I find that a good way to ream or fit bronze bushings is to take a bolt or a piece of pipe smaller than the pin intended for the bushing.

Wrap emery cloth around it, push the



Cuts Fast and Has Smooth Surface.

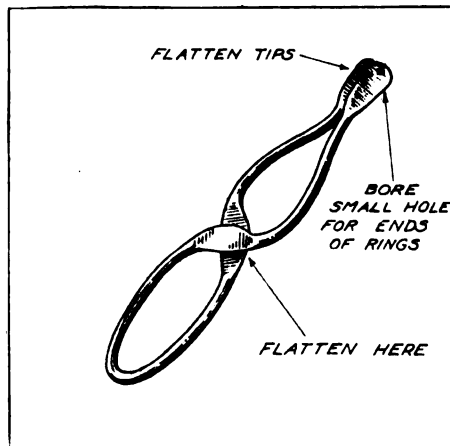
bushing on and draw along to the point where the bushing will not slip but will turn on the emery. It will cut fast and have a smooth surface.—C. A. M., N. Dak.

Simple but Effective.

I dropped one of the nuts from the brake on the low speed rod of my car. After several attempts to fish it out from the bottom of the crankcase I stuck a part of a bar of soap on the flywheel and the nut came from its hiding place. This may help some other fellow.—O. P. F., Ark.

Handy Piston Pin Remover.

An especially handy and easily made piston pin remover has been invented and produced for his own use by J. W. Brinser, of Brinser's truck garage, Falls of Schuylkill, on the outskirts of Philadelphia, Pa. It is a substitute for the usual



Easily Made Piston Pin Remover.

method of ring removal by hacksaw blade.

He took a 16-inch length of 3/16ths cold rolled steel, doubled it, crossed it in a Y, hammering it flat where crossed. He next rounded the two sides of the Y part and brought the very tip of each up straight, boring close to each end a small hole, big enough to admit the extremity of a piston ring of even the largest size.

By simply squeezing the handle of crossed steel, after the end of the piston ring has been raised and fitted into the hole on its respective side of the Y, the ring is forced widely apart and quickly slipped from the piston.—K. H. L., Pa.

Home-Made Signal Device.

An interesting and effective device which has been shown on trucks recently is home-made.

A hand, about twice the size and with fingers outspread, is cut from a piece of thin wood by a small scroll saw. A screw in the center of the wrist fastens it to the outer edge of the windshield, or body, and a cord from the end of the wrist to the wheel places it within easy control of the driver.

It hangs out of sight until a jerk of the string brings it into full view of the car behind, and the driver does not have to keep his hand from the wheel while using the signal.—M. S. W., N. Y.

Climbing the Steep Hill.

There are often times, when traveling on unfamiliar roads, that one will reach a steep hill just at the time the gasoline is low in the tank. A common method of overcoming this difficulty is to turn the car around and back up the hill, but there are times when this is dangerous or impossible.

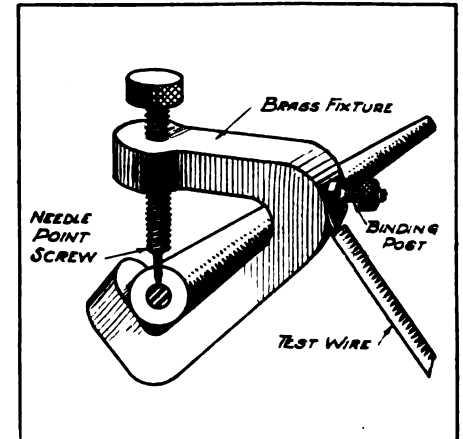
If this ever happens to you, take your tire pump and insert the tube through the opening in the gasoline tank. Pack around the tube with waste or rags so as to make the gasoline tank as nearly air-tight as possible. Pump air into the tank and this will force the gasoline up into the engine. This method is practical and sure. If the hill is long and there are two in the car, one can keep pumping until the top of the hill is reached.

If you are starting on a trip and expect such hill troubles you can prepare ahead. Drill a hole in the top of your gasoline tank and solder in a valve from an old tube. Then, when you need to use the pump, stick a match stick in the air vent of the tank and your gasoline tank is air-tight.

Be sure your gasoline tank is entirely empty before drilling or soldering.—V. I. T., Idaho.

Cable Tapping Device.

The illustration shows a handy little cable tapping device that is easily constructed, durable, and just the thing needed when hunting down electrical troubles. The frame of this device can be bent up to the



Handy Little Cable-Tapping Device.

shape shown, from one piece of brass bar. The other details are apparent in the illustration.—C. H. W., N. H.

Removing Ford Radiator Bolt.

Remove the radiator and place the point of a bar behind the lower end of the bolt. Bend it and the bolt will drop out. It can now be placed in the vise and the nut removed and used on the new bolt or saved.—A. C. O., Neb.

Chain Hoists Supplant Derricks.

At the repair shops of the White Automobile Co., at San Francisco, portable derricks have been eliminated by the chain hoist shown in the illustration, which is supported from the beams.

At various points throughout the plant, heavy steel clamps have been attached to the beam as shown at A. These are lo-



Chain Hoist Supported From Beams.

cated at points where it is probable that heavy objects are likely to be handled.

The chain hoist can be quickly taken down and placed on any other beam.—C.

* * *

Making Slots With Hack-Saw.

When it is desired to cut a small slot in metal, do not make two cuts with the saw and then break out the piece and finish with the file.

Put two or three blades in the saw at once, and then the sides of the slot will be parallel. Also, there is no piece left to be broken out.—R. W. T., Missouri.

* * *

Damaged Gaskets.

Gaskets damaged in removing crankcases can be made oil-tight for replacement by sticking packing to the case, over the gasket, just as it comes off.

Use hard oil to hold the wick in place. Start with an end and stick the wick close to the bolt holes all around the case. Similar treatments are effective wherever oil or water retaining gaskets are used.

In the absence of new cylinder-head gaskets, we have repaired the old one effectively by using a good asbestos wick packing.—O. C. A., Neb.

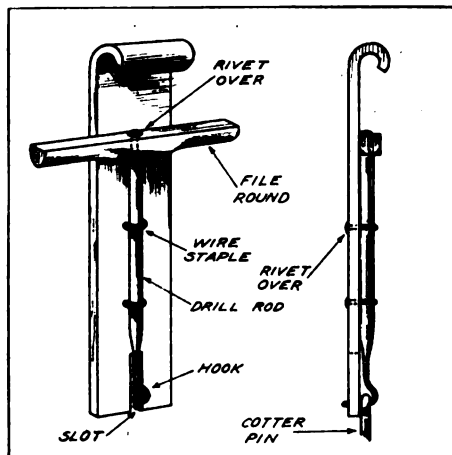
* * *

Cotter-Pin Puller.

Pulling out cotter-pins is a task which taxes the patience of almost anyone. With a tool such as shown in the illustration, the work becomes simple. A piece of iron, about one inch by 1/4th inch and of any convenient length, is curled over on one end and slotted on the other.

This piece is drilled to receive two heavy wire staples in which the hooked rod is to slide. The hooked rod is filed smaller on one end and formed into a hook which will pass through the slot.

The other end is riveted into a cross-



Makes Cotterpin Pulling Easy Task.

piece. The staples are riveted into place so that the hooked rod may slide freely. The cross-piece should be rounded on the lower side so as to avoid injury to the fingers.

In use, the hook is pushed past the end

of the flat rod and hooked into the cotter-pin. The flat rod is then lowered against the pin or bolt carrying the cotter-pin.

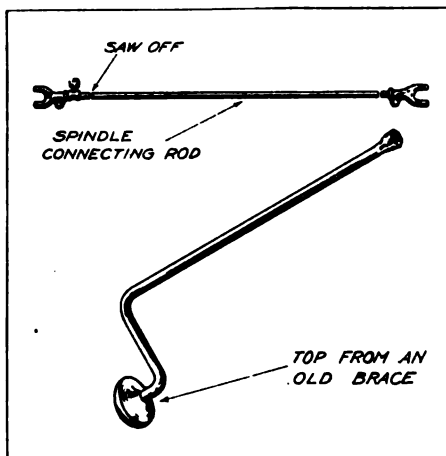
With the coil of the flat rod in the palm of the hand, the cross-piece is grasped with the fingers and drawn up, pulling the cotter-pin with it. As the hook passes clear through the slot, the cotter-pin cannot fall off and become lost.—R. H. K., Pa.

* * *

Wrench for Shock Absorbers.

Being a reader of your valuable paper and a garageman, I send you a sketch of a handy wrench to be used in putting on Hassler shock absorbers.

Take an old worn-out spindle connecting-rod of a Ford that holds the front wheels together and it will make a good wrench for the purpose. The rod being hollow permits the long threaded bolt to enter into this space to turn down the nut that holds the springs together. Any blacksmith who knows how to work different kinds of iron can make this wrench.



Connecting-Rod Makes Handy Wrench.

You place the bolt and spring in position, take the wrench with the hexagonal end and place it between the spokes of the wheel in line with the bolt, stand erect on the side of the car and turn the nut down. You can do this with ease and in half the time you could with any other wrench.—J. W., Ohio.

* * *

Remove Carbon With Atomizer.

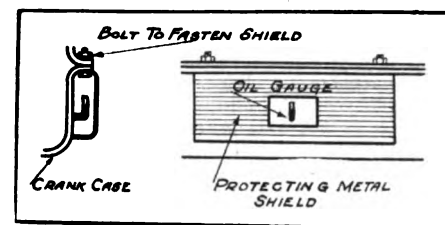
There are many motorists who would be glad to have their motors treated with carbon remover at frequent intervals, but few shops go after this business.

It is difficult to get the liquid on all the internal surface of the cylinder so that all the carbon will be removed. One Iowa shop foreman uses an atomizer to put the liquid into the cylinder and, by being able to get it on all the surface, has built up a nice business.

This method is very economical with the liquid, and he is able to do many times as many jobs with a can of the liquid and do them better than with the ordinary method. A spray pump would also be practical.—S. E. G., Iowa.

Oil Gage Protector for Small Car.

The accompanying illustration shows how an oil gage was protected on the side of the crankcase underneath the car, so that the operator of the car can see at a glance, or with a flashlight, just how much



Protecting Case for the Oil Gage.

oil is in the case and not run the car without oil in it and ruin his engine.

This sheet-metal protecting case is fastened to the two bolts and a slot is cut in the side so that one can see the oil gage. This will effectually protect the gage and fend anything from it in case an obstruction comes up against the crankcase, and it has worked on my car with great success.—C. H. T., Pa.

* * *

To Remove Differential Quickly.

Hoist or jack the rear end high enough to set a four-by-four, 24 inches long, under the frame and against the springs far enough ahead of the axle housing so that the spring-clip nuts may be easily removed.

Block the front wheels and let the car down on the blocks. Extra staging can be placed under the running boards for safety. Remove the brake cables at the drum on the left side. Remove the spring clip and the bolt on the left side. Loosen the four cap-screws holding the propeller-shaft housing to the differential housing and remove the two on the left side. Remove the right wheel and take the nut from the truss rod. Place a block or a jack under the housing on the right side and remove the bolts holding the housings together.

Now, by pulling out and back on the left wheel, the housings will separate and expose the entire differential. To make differential repairs, the left wheel must be removed also. A drive pinion may be installed by throwing the shifting lever in gear and blocking the motor.

This method cuts the average time on the differential work in half.—O. C. Mont.

* * *

Holding Studs While Threading.

Take a nut of the size and thread to be cut on the stud, and with a hacksaw cut a rather wide slot in the nut—that is, saw the nut as though it was to be split in two but cutting the one side only.

After the one end of the stud is threaded, screw the nut on and then clamp it in the vise, in such a manner that the slot in the nut is in the gap in the vise jaws. Then thread the other end of the stud.—G. W. L., Pa.

Readers' Questions and Answers

Clutch Drags.

I am enclosing postage for information that I wish you would send me at once.

I have a Monroe, 1921, which is giving me trouble with the clutch. The disks in this clutch do not drag when released, or at least they seem to be free. While the motor is running, it is almost impossible to shift from one gear to neutral or on to the next speed.

The clutch is listed on the specifications as Monroe's own make.

Could you tell me what makes this clutch drag? Is it possible that there is a bearing that is not getting oil?

I will appreciate anything you can tell me about this clutch.—P. S., S. Dak.

From your description of the trouble with this clutch, we suggest that your trouble may be attributed to one of the following causes: Accumulation of foreign matter or dirt between the disks of the clutch; improper adjustment or setting of the clutch pedal; failure of lubrication of the clutch shaft bearing or bushing.

We suggest that the clutch be cleaned with an application of kerosene oil and, should it still continue to stick or drag, we advise dismantling and an inspection of the bearings and bushings of the clutch shaft; also the channels of lubrication. Perhaps an inspection of the locks on the shifting forks in the transmission, to see if they are working freely, would also be advisable.

The clutch should be adjusted so that the shaft comes to a gradual stop when the clutch pedal is pushed forward.

* * *

Painting the Automobile.

We are building an automobile, the fenders and radiator shell of which is made of galvanized iron and the main part of the body is made of the ordinary black iron. We will thank you to advise us the proper paint to use in painting this machine.

We would also like to know if it would be possible to give the radiator shell a nickel plate in case we so desired. We intend painting the exhaust pipe white. What kind of white paint would you advise using, which would withstand the heat?—E. H. K., N. C.

Care has to be exercised in painting galvanized iron, for the reason that there is a soapy substance on the surface of new galvanized iron which prevents a paint adhering to the metal unless it is thoroughly removed.

Acetic acid is serviceable in removing this coat. Frequently, ordinary weathering conditions are recommended in order to prepare a galvanized iron surface for paint, where that is practical. After this soapy surface has been entirely eliminated from the surface, galvanized iron can be painted as well as any other metal surface.

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

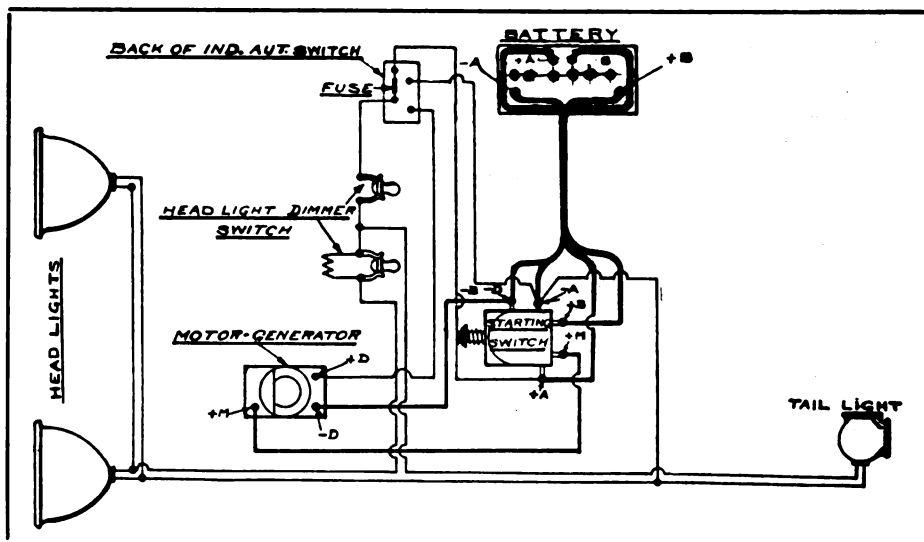
There is no white paint which can be used on the exhaust pipe of an automobile without turning yellow. All oils used in making paint darken when subjected to heat, and a white paint made without oil would not be sufficiently durable to give any wearing qualities. We suggest aluminum paint as the most practical paint for this particular use.

We believe that the radiator shell can be nickel-plated if you so desire, but it would, of course, have to be sent to an expert nickel-plater.

* * *

Apelco System Wiring Diagram.

Kindly advise how we can secure a wiring diagram for model 32 Commonwealth using 6-12 single unit, Apelco system, Connecticut ignition.—J. H. McM., N. Dak.



Wiring Diagram for Model 32 Commonwealth Using 6-12 Volt, Single-Unit Apelco System

We are publishing in this issue a diagram of a typical installation showing a battery and starter circuit of the Apelco starting and lighting equipment which was manufactured by the Splittdorf Electrical Co. several years ago.

In the general circuit, the current goes from $D+$ in the generator to $D+$ on indicating switch, through the winding in the coil, coming out at $B+$, then to $A+$ on starting switch, where it divides, one side leading to $A+$ on battery through battery to $A-$ on starting switch.

The other half of the current flows through the jumper in the switch to $B+$ on starting switch, through to $B+$ in battery through battery to $B-$ on starting switch. $B-D$ are the common return points of the current on starting switch, from there to $D-$ on generator.

When the starting switch is depressed, the current flows from the battery at $A+$ to $A+$ on starting switch, through switch to $M+$ on switch, then to $M+$ on motor dynamo, through motor-dynamo to $B-D$ on starting switch, then to $B-$ on battery, through battery to $B+$ on battery, then to $B+$ in starting switch, to $A-$ on switch to $A-$ on battery, through battery, to $A+$ completing the circuit.

* * *

Magneto Misses.

I have a Bosch magneto on a Buick four, 1913, that is puzzling me. It works without a miss for a day or two, then first misses on No. 3, then the miss jumped to No. 1, and then to No. 4. There is only one miss at a time.

I have tried a new magneto distributor head and the same thing happens. I have just had it overhauled at a reliable electric place in Phoenix. The engine is O. K. in every respect.—H. E. P., Ariz.

We suggest that your difficulty may be attributed to one of the following causes:

Contacts in the breaker box of the magneto set too close or too far part; contacts on the breaker arm and arm contact worn too thin or burned away, causing them to weld or stick together.

If new points or contacts have been installed on the breaker arm and contact, it is possible that the metal may be of poor quality, causing the contacts to weld or stick together.

We suggest that you try a new set of breaker points from the manufacturer of the magneto.

* * *

Acid for Joining Inner Tubes.

Inclosed herewith find check for \$1 for a yearly subscription to your magazine.

I should also like to know if you could furnish me the formula used by the rubber companies in making acid for joining inner tubes. All of the acids on the market today, I find, are very unsatisfactory and will not do the work.—E. N., Pa.

We have been informed by one of the rubber manufacturing companies that sulphur chloride is used for this purpose, with the addition of some solvent such as benzol, carbon bisulphide or tetrachloride of carbon.

* * *

Motor Pounds.

We have a 1916 model Ford touring car in which the motor pounds and clatters very much.

We have tightened the main bearings and connecting-rod bearings, ground the valves and removed the carbon. It runs well for a week or so, and then again becomes noisy.

The motor has plenty of power and the pistons and rings are in good shape. Could you suggest a reason for this noise returning so soon after the bearings being tightened?—E. H., S. Dak.

We suggest that your trouble with the motor mentioned, is perhaps due to worn piston pins or bushings, and also that the bushings on the camshaft may be worn. These bushings on the camshaft and the piston-pin bushings should be replaced with new bushings properly fitted.

The main bearings in a motor of this model are no doubt badly worn, allowing considerable end play in the crankshaft of the motor. We suggest that the main bearings of the motor be rebabbitted and new bearing caps used. The bearings should then be burned or scraped in.

The connecting-rod bearings should also be replaced if badly worn.

* * *

Flywheel Hub May Have Cracked.

We have a 1916 model Briscoe car that is giving us trouble with the clutch. We have adjusted this clutch according to the instructions with the car, but are having considerable trouble shifting into any of the gears while the motor is running.

The clutch facing seems to be in good condition and clears the clutch seat when the clutch is thrown out, and the clutch shaft also has plenty of grease.

Would you kindly inform us through your paper the cause of this clutch dragging?—N. B., Ohio.

In this model of the Briscoe car, the flywheel of the motor is pressed onto the

crankshaft of the motor, the crankshaft being fitted with a key and the flywheel of the motor with a key-way. The hub of the clutch cone runs very closely over the hub of the flywheel.

From your description of the trouble you are having, we believe that the hub of the flywheel of the motor has cracked and has expanded or opened up, causing it to bind in the hub of the clutch cone.

This will cause the drive shaft to revolve, even with the clutch thrown out, and will give you the difficulty you are having in shifting gears while the motor is running.

* * *

Magneto Trouble.

We are having trouble in obtaining high tension current from the magneto which is a part of the equipment on a 1911 Winton Six. The ignition coil and distributor is incorporated in this magneto and it serves the dual purpose for both battery and magneto ignition.

The primary current is O. K. and it functions properly for battery ignition. The external wiring and switches have been carefully inspected.

Any assistance in this matter will be appreciated.—F. W., Wash.

The trouble is probably in the coil, since you state that the primary current is O. K. and that it functions properly for battery ignition, or it may be that the magneto is not throwing any current.

We believe that the best plan would be to have both the magneto and the coil inspected by some competent electrical repairshop that is equipped for handling work on magnetos.

* * *

Gear Shift Trouble.

We have a Scripps Booth car of a late model, six cylinder. We are unable to shift gears into second speed or high after the car is moving. All gears mesh properly when the car is standing. The clutch seems to work properly and stops revolving the instant it leaves its seat from the flywheel of the motor.

The bearings on the countershaft and driveshaft in the transmission are perfect; also the shafts are in perfect order. One of the local garagemen ground down the teeth

on second and high-speed gear, but they still refuse to mesh when the car is in motion after low speed. Can you suggest what the trouble may be?—G. P., N. Y.

From your description of the trouble of shifting gears in the Scripps Booth car, your trouble is not located in the transmission. We believe your clutch is causing this difficulty.

Perhaps lubrication to the clutch shaft bearing or bushing has failed, causing the clutch to bind or not revolve freely when the pedal is pushed forward.

We suggest an inspection of this bearing and bushing; also see that the clutch is adjusted so that the clutch cone will make several revolutions before stopping after the clutch pedal is pushed forward. The clutch pedal should not stop instantly as you mention.

* * *

Wiring Diagram for Mea Magneto.

We have a 1914 Winton Six, which is equipped with a Mea magneto. The ignition coil and distributor are incorporated in this magneto and it serves the dual purpose for both battery and magneto ignition.

If possible, we should like to have you publish an internal wiring diagram for this magnet.—J. W. C., Ill.

The internal wiring diagram which you request is shown on this page.

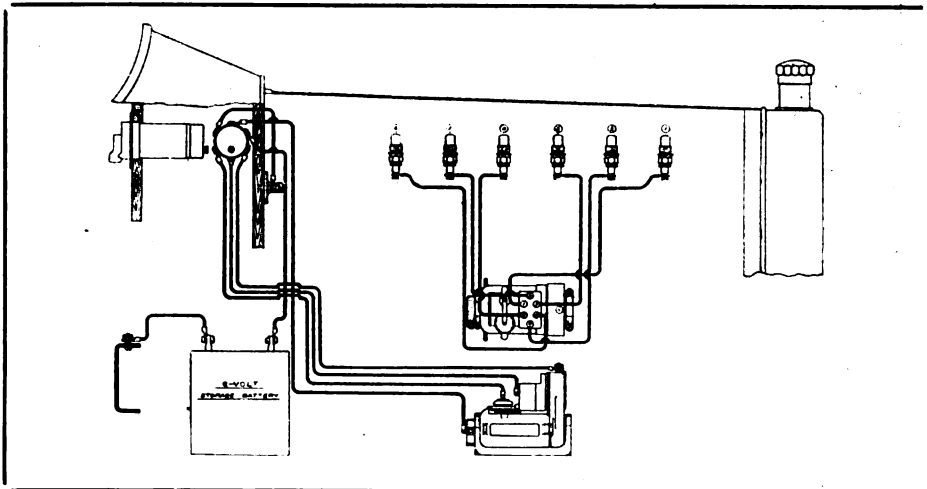
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Sliding Gears Fail to Engage.

Can you tell me, through the American Garage & Auto Dealer, why sliding gears sometimes do not engage as quickly as they should?—L. M., Colo.

The trouble may be due to the binding in their bearings of the shifter yoke actuator rods. Sometimes, also, particles of metal from burred gear teeth interfere with the gear action. If the main and countershaft distances have changed because of bearing depreciation or other reasons, this may make it difficult to engage the gear teeth properly.

If you find that none of the faults mentioned are present, we should say the trouble is probably in the clutch action.



Internal Wiring Diagram for the Mea Magneto.

Automatic System for Small Garages

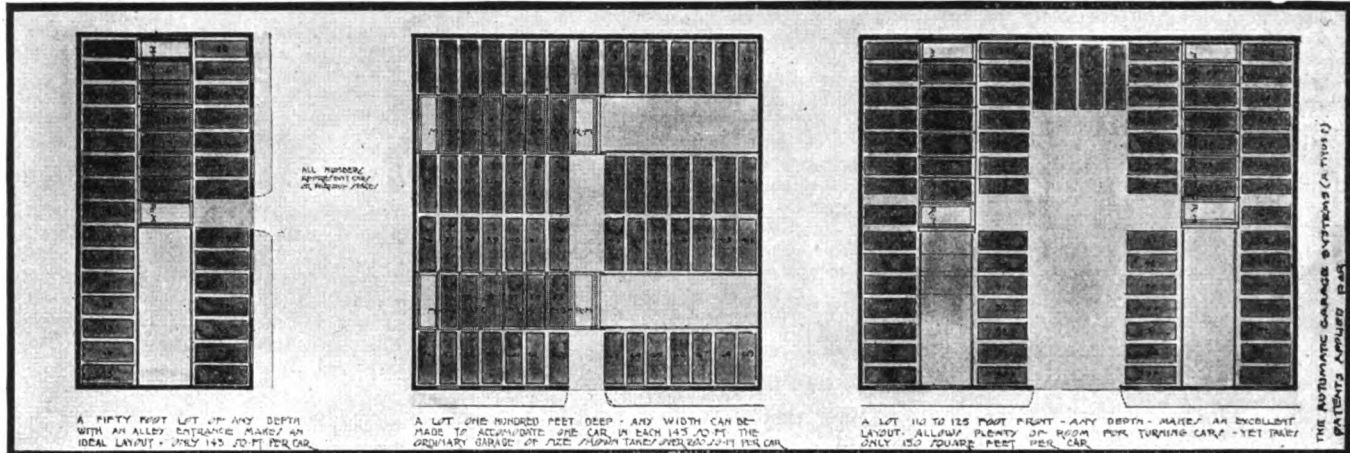
Illustration of 250-Car Garage on Lot 120 Feet Front by 165 Feet Deep, First Floor Five Feet Above Grade, Basement is Five Feet Below Grade Only 150 Square Feet Per Car Required—One of Many Possible Layouts

Wasted space is the garage operators' biggest loss. An attempt to overcome this loss by crowding cars results only in confusion and inconvenience to customers and the eventual loss of their patronage. The crowding of cars is directly responsible

ator to park from four to six cars in the same space occupied by three cars when parked in the ordinary way; eliminates all danger of congestion; makes the handling of cars easier; speeds up the handling of cars; eliminates all danger of collision and

have a push button control, as in elevators.

In multiple-floor garages using elevators, the system is said to be very efficient. In this case cars can be handled entirely by machinery, never being under their own power while they remain in the garage.



Layouts for a 50-Foot Lot of Any Depth, a Lot 100 Feet Deep and a Lot 110 to 125-Foot Front.

for the delays in maneuvering cars into position and for the scratching of fenders and other minor damages to cars so common in many garages.

The Automatic Garage Systems, 537 S. Dearborn, Chicago, have designed a system to eliminate all these difficulties and utilize space to the highest degree of efficiency. Increasing competition and the demands for better service are making such a system a necessity as well as an excellent financial investment.

Some of the advantages claimed for the automatic system of automobile storage are:

That this system enables the garage oper-

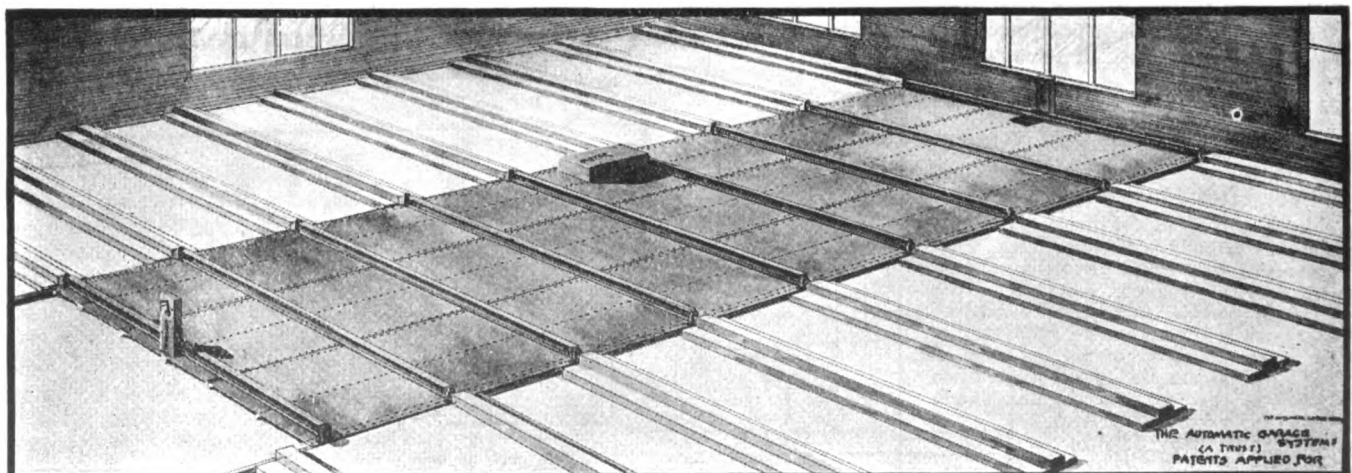
minor damages resulting to cars therefrom.

These features of safety, speed and convenience, insure a full garage under keenest competition. In addition the cost of installation is small, so that, states the manufacturer, from a financial viewpoint, it is a sound investment, yielding a high per cent of profit.

The illustrations show only a few of the many ways of installing the automatic system. The system can be installed as easily in a garage already built as at the time of construction. It can be made to fit practically any condition and limitation. It can be so arranged that a driver can sit in his car and operate it. It can

The machinery and equipment used is standard. A small motor with controller, I beams, angles, and steel plate, wheels and rails, constitute practically all the materials used. The assembled job is simply a long platform which the motor drives back and forth on a set of wheels guided by rails.

The I beams, seen in the illustration, are placed about 6 feet, 6 inches apart, so that a car may drive between any two of them. Each I beam has a wheel on each end running on a steel rail. The platform slides back and forth in what would ordinarily be the aisle, except that the aisle is only as wide as the length of a car.



Method Employed by Automatic System of Automobile Storage of Installation in Garages Already Built or Under Construction.

The floor of the platform is 4 inches above the bottom of the rails so that when an installation is made in a garage already built, and the rails are set on the floor, runways of concrete or timber 4 inches high receive the automobile wheels as they roll off the platform. Between these runways are guards to keep the wheels of different cars apart.

The platform is slightly over one-half the length of the row of stalls on either side of it, so that the space on each end of it can be brought to a common loading and unloading point near the center of the length of the row. When a car enters the garage, it drives to the loading place and onto one of the end spaces on the platform—one space serves one-half of the garage, and the other end space the other half.

The operator, or if desired, the man in the car, by means of the controller shifts the platform until the car is opposite its stall, when it is run into its stall. When all stalls are full, cars may be parked on the several spaces on the sliding platform, except the two end spaces which are kept open to permit service to and from all other stalls.

A staff of garage engineers employed by the Automatic Garage Systems has made an extended investigation of garage conditions throughout the country, and has devised and perfected the automatic system to meet the difficulties and overcome the inefficiency it found in many garages. It will at any time direct its attention to the solution of your garage problems and submit, without obligations, tentative plans, estimate of cost, etc., of any particular installation.

A Gruelling Test Run for Shock Absorbers.

The Auto Specialties Mfg. Co., St. Joseph, Mich., is announcing the results of a test run of 10,532 miles made by a Ford touring car equipped with a set of their Drednaut shock absorbers. This run was made to give the shock absorbers, which are said to have a number of exclusive features in design and construction, a thorough tryout before entering into production. The test has a peculiar interest in that it is the first one undertaken to study the performance of an accessory under such a wide range of conditions.

Leaving St. Joseph on March 7 and returning May 21, during the rainy season, the Ford traveled in a southerly direction to Florida, stopping at Louisville, Chattanooga, Savannah and Tampa en route, and at Montgomery, Jackson, Vicksburg, San Antonio, El Paso, Phoenix and Los Angeles preparatory to the northern leg of the trip, which included Portland, Spokane and then back down through Butte, Minneapolis, Milwaukee, Chicago and back to St. Joseph.

Detours were not made. Impassable

roads, sand, rocks, alkali, clay and ordinary "no bottom" mud roads were encountered—sought out rather than avoided—and examination of the shock absorbers at the end of the trip revealed no defects, nor was there any expense for repairs or replacements to them during the trip.

Drednaut shock absorbers are a combination rebound check and shock absorber. The car is suspended on four vanadium steel springs of unusually good grade. High quality malleable castings are used as a basis and drop-forged parts are substituted where excessive wear is found. Being manufactured of standard equipment for the industry, they are familiar with design and materials and have brought out what they claim is a superior shock absorber for use on every type and model of Ford, and are working on a special Drednaut for Ford truck use.

Charlie Hendy Leaves Ford to Sell Simplex Theftproof Locks.

It is announced that Charles Hendy, Jr.,—"White Paint" Hendy to a host of friends and acquaintances in the automotive trade—has withdrawn from the Ford Motor Co., to become associated with the Simplex Corp., 2214 So. Michigan Ave., Chicago,



Becomes Vice-Pres. and Gen. Mgr. of Simplex Corporation.

manufacturers of Simplex Theftproof automobile locks.

Mr. Hendy acquires a stock interest, and becomes vice-president and general manager of the Simplex Corp.

He has been connected with the Ford interests for 14 years. Before coming to Chicago, two years ago, as manager of the Chicago plant, he was for many years manager of the large Ford Motor Co. plant at Denver, Colo., one of the most important in the country.

Equipment Association Inaugurates Sales Promotion Work.

The Automotive Equipment Association has announced that Ray W. Sherman has been selected to head the sales promotion

work of its organization. Mr. Sherman was formerly editor of the Motor World.

Mr. Sherman assumed his new duties the first of this month, and the association feels that the mere fact that the name of so able a man as Mr. Sherman is linked up with this movement assures success from the start.

At a recent convention held by the Automotive Equipment Association, at Mackinac Island, a resolution was made and adopted to make Saturday, August 6, the opening date of a sales promotion week, a bulletin to this effect being issued to all members of the association.

It was decided that a good way to increase sales was to suggest that the various dealers and repairmen offer a commission of 5 per cent in addition to all the regular remuneration to their salesmen or workmen on all sales made by them of automobile accessories or equipment.

It was believed that, in this way, much educational work could be done, as well as educating the dealer to make his place presentable, display his goods and wares and behind it the incentive to make sales by interesting prospective customers at every opportunity, and the best way to do that is to interest, in a substantial way, the sales forces of every establishment.

The further suggestion was made that a garage or repairshop with over six employees should designate one to supervise operations, who should not work but see that all work was done properly.

Courtesy Club Organized by Dort Distributors at Detroit.

The first annual meeting of the Dort Courtesy Club at the headquarters of the Baker-Fisk-Hugill Co., Detroit distributors, was such a success that similar organizations may be formed by Dort dealers throughout the country.

Membership in this club has mounted to 600 in a year. There is no cost, only an obligation to help any other Dort owner in time of trouble. If a member meets a Dort owner on the road who is out of gasoline, he lets him have enough to get to a filling station.

If he is stalled through mechanical trouble, the member helps him out if possible; if not, he drives to the nearest telephone and calls up the service station. If there has been a smash-up, he takes the other party in his car if he has room, if not he telephones for relief.

Paragraph.

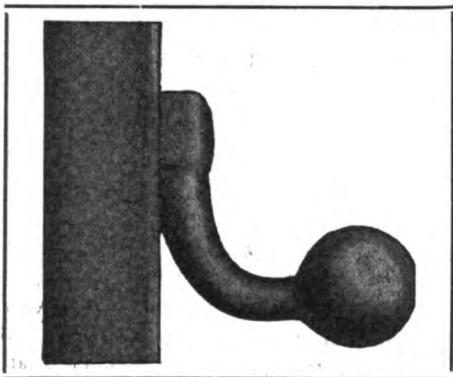
KRASBERG PISTON RING CO., 536 Lake Shore Drive, Chicago, announces the appointment of a number of new distributors for their piston rings, among which are the following: Piston Service Co., 2118 Park Blvd., Detroit, Mich.; DeVassie, Beedle & Duffey, 325 Liberty St., Pittsburgh, Pa.; S & S Sales Co., Philadelphia, Pa.

Accessories—Dealers' Key to Profits

Loomis Patented Ball Grip Handles for Ford Car Doors.

Increased convenience in opening doors on Ford cars is now made possible by the invention of the C. F. Loomis Mfg. Co. of a ball-grip handle for Ford car doors.

These new door handles are as ornamen-



Useful Ball-Grip Handle for Ford Cars.

tal as they are useful. They are attached in a jiffy, by tapping them on the regular handles. A light tap of the hammer is all that is necessary.

The new ball-grip handles offer especial advantages to the jobber and the dealer. They require no service for installation, develop no subsequent mechanical trouble, and they remain sold. They are quoted at a particularly attractive price.

Full details may be obtained by writing to the C. F. Loomis Mfg. Co., which is located at 428 Liberty St., Peoria, Ill.

There's a Cure for That Loss of Motor Power—Everytytes!

"You will eventually. Why wait?" the sign-board prominently placed at a turn in the road announced to passing motorists. It caught the eye of Tom Mathews for a moment as he drove by in his Oakland.

"Now what good does a thing like that do?" he asked—the question, since he was the only occupant of the car, perhaps being addressed to the mild-looking Jersey who surveyed him so calmly from under a tree beside the road.

However, his question unanswered, he continued: "Looks like they'd have sense enough to at least tell what it is, even if they can't tell where to get it. Some fool advertising scheme."

Now Tom always contended that there was no place for curiosity in the manly make-up and yet—

A few miles farther on another sign stood out with the interesting message: "If you've never used them, you don't yet know the service your car can give you."

"Well, I'll be hanged," muttered Tom. "It's something for a car. That's certain. What in time is it, anyhow?"

Then as he drew near the thriving little city, there was another, reading: "If your car pumps oil and loses compression, if you are wasting oil and gasolene—come in and see us. It's a secret—but we'll tell it!" Then, for the first time, followed the name of a dealer, which Tom at once recognized as that of a man with whom he had done business on several occasions.

"Guess I'll drop in and see if Gaines has any of those new camping kits the 'missus' was talking about this morning. He had told Mrs. Mathews quite emphatically that morning that he would not possibly be able to find time to make the suggested purchase!

In the window of the Gaines shop, a card conspicuously placed, announced: "Give your car a chance. They'll make it run so smoothly you'll think it's a different car. Come in and let us tell you about them."

In he walked and Gaines, the genial proprietor of the shop, hurried up to greet him.

"Say, Gaines, what in the world are you driving at in all these signs you've got scattered about the country?"

"Got you, did they Tom?" grinned Gaines. "All right, come over here and I'll show you."

There on the counter, on a good-looking tray, in solitary splendor, lay a single piston ring. The placard just back of it read: "Here's our secret—for a perfectly running motor!"

"All that fuss about a piston ring?" questioned Tom in disgust.

"Not 'a piston ring'—rather say THE

piston ring," objected Gaines. "Let me tell you why."

"This ring is called the Ever-Tyte, and is made by Walter A. Zelnicker Co., of St. Louis, Mo. Now, let me ask you something. Do you have any trouble with your car loafing on a hill?"

"Why, yes," answered Tom. "I had a little trouble of that sort this morning. Say, that is a corking good-looking ring, isn't it Gaines?"

"It certainly is," answered Gaines. "I've been selling these rings for the past two years without receiving a single complaint about them. One repairshop in this city has purchased 85 dozen from us, 45 sets of which were installed in Nash cars. All the owners are sure good boosters for them."

"On one car in particular, in which Ever-Tyte rings were installed—an Oakland coupe—the motor was pumping oil badly. Since the Ever-Tyte rings were installed, the motor has been running with perfect satisfaction."

"Another fellow told me that since he had us install a set of Ever-Tytes in his Dodge about a year ago, which was losing compression and pumping oil badly, he found, on a test run, that he used only 11 gallons of gasolene, one quart of oil and three pints of water in 209 miles. He says the car is still performing nicely, and that he has had no fouling of plugs."

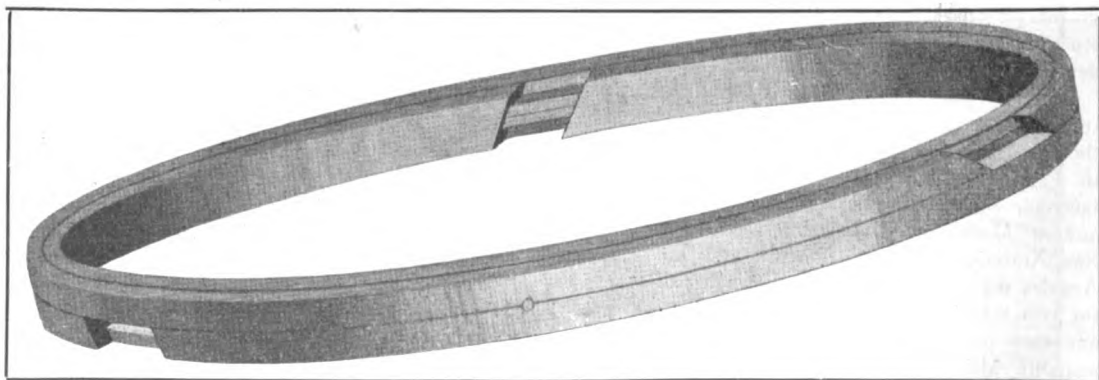
"I've been having a good deal of bother with fouled plugs, lately," remarked Tom. "Come to think about it, it looks like I might do with less gasolene and oil, too."

"A set of Ever-Tytes will fix you up right," assured Gaines.

"All right, Gaines. Let's have them."

The statements regarding the results obtained from the use of Ever-Tyte piston rings, are taken from actual testimonials received by the Ever-Tyte Piston Ring Division of Walter A. Zelnicker Co., St. Louis, Mo., from pleased customers.

Another dealer wrote that he had installed Zelnicker Ever-Tytes in about 20



"Here's Our Secret—For a Perfectly Running Motor," Said the Dealer, "The Ever-Tyte Piston Ring."



TWO STAGE EFFICIENCY *is* INTERCOOLER EFFICIENCY

Refuting Misleading Claims

*as to Horse-Power
and Capacity Ratings
of Two-Stage
Air Compressors.*

As manufacturers of BOTH Single-Stage and TWO-STAGE Air Compressors (therefore unbiased), we desire to go on record to the effect that—

1—Claims that a Two-Stage Compressor will compress anywhere from 15% to 50% more air with the same horse-power;

or,

2—That Two-Stage Compressors will compress the same volume of air with 15% to 50% less horse-power

are absolutely misleading statements, not supported by facts.

During our sixty-seven years of business existence, we have never sold our product by misleading statements or unsupportable claims.

TWO-STAGE Compression permits the heat generated by compression to be reduced in the intercooler between the low and high pressure cylinders, the high pressure cylinder thus handling a greater volume of the cooler and denser air. Thus the efficiency of a two-stage compressor depends directly on the degree of intercooling effected.

Curtis Intercoolers are made of COPPER Tubing, with thin COPPER Radiating Fins rigidly attached. This insures radiation 135% greater than cast iron. Excepting gold and silver, copper radiates heat faster than any other metal.

Curtis Engineers have been the only ones alive to the advantages of a COPPER Intercooler and the fact that the efficiency of the intercooler determines the efficiency of a Two-Stage Compressor. The COPPER Intercooler is but one of the many ORIGINAL features of the CURTIS TWO-STAGE Compressor.

CURTIS PNEUMATIC MACHINERY CO.

1515 Kienlen Avenue

St. Louis, Mo.

Branch Office:

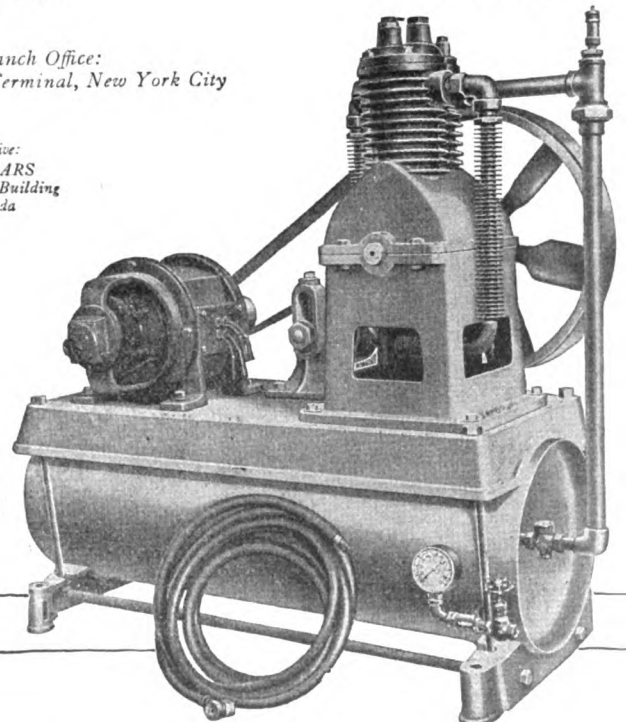
530 UHudson Terminal, New York City

Canadian Representative:

JOSEPH ST. MARS
706-B Sterling Bank Building
Winnipeg, Canada

Style "V"
Two-Stage

Furnished with 2-4 or 1 h. p. motor. Automatic starting and stopping device, including Curtis Centrifugal Un-loader, extra. Starts against no load.



different makes of cars, among these being twin motors of two different makes, and he further states that the best of results have been obtained in every case.

Ever-Tyte rings have been installed in tractors and trucks with equal success, and in passenger cars of all makes.

Ask the Ever-Tyte Piston Ring Division to send you some of their interesting "Evidence" booklets.

Simplicity and Economy Features of Little Jeff Spark-Plug.

The Little Jeff spark-plug is the result of a number of years of close study on the part of the inventor and designer—Walter N. Cotton, a graduate engineer of the Toronto College. Mr. Cotton has been, for the past 26 years, designing and building various forms of ignition devices for internal combustion engines, one of these devices being the first high tension magneto ever constructed.

After spending a considerable time on ignition systems, he made a thorough study of the spark-plug field. This field includes any number of freak devices of more or less merit—often less, rather than more.

After a lot of work and experimentation, and with the idea in mind of making a simple, sensible, economical plug complete in every way, insofar as its ability to function properly and give satisfaction was concerned, he designed the Little Jeff. The first one was put into service about two years ago with very pleasing results.

With Mr. Cotton's ability as an engineer, it has been possible to design machines for the manufacture of this Little Jeff plug that have made very marked progress over the old way of making plugs.

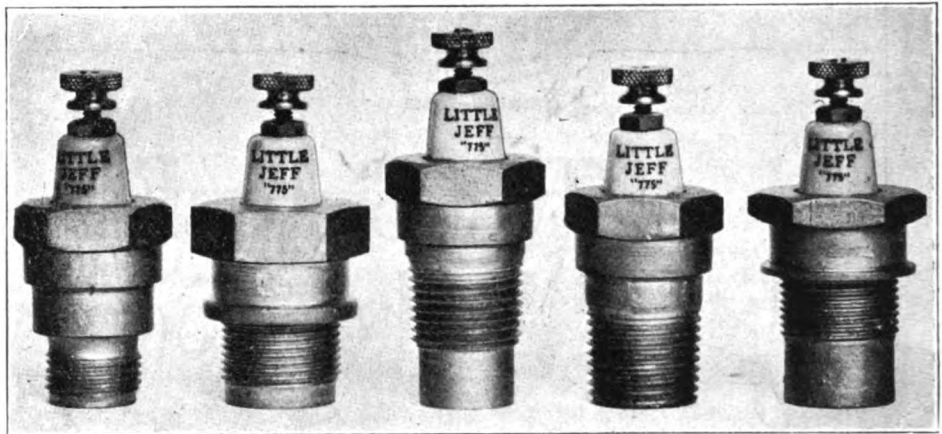
A material reduction in the cost of construction, particularly, has been made possible. These savings in construction are being passed along to the consumer in the form of a saving in price.

The General Accessories Corp., Chicago,

started in a very modest way at 2010 Larabee St., Chicago. It is now running at full capacity, turning out 5,000 plugs a day in five sizes, $\frac{7}{8}$ -18, $\frac{7}{8}$ (Buick), $\frac{1}{2}$ -inch reg-

Do you know how many things can be thoroughly cleaned with Spee-Dee? Here are a few of them:

It is said that it will: Clean dirt, grease



Ability to Function Properly and Give Satisfaction Basis of Construction of "Little Jeff" Spark-Plugs.

ular (Ford), $\frac{1}{2}$ -inch long (Reo) and Metrics.

The officers are: Walter Cotton, president; Clarence N. Kehm, secretary; and A. L. Kanagy, treasurer. John W. Moody is looking after the sales.

Prominent Dealer Features Spee-Dee in Display Window.

One of the most attractive display windows we have seen recently is that shown in the illustration.

The Jackson Motor Supply Co., prominent jobbers of Pittsburgh, Pa., devoted their main display window—a window nearly 20 feet wide, on Baum Blvd.—to a demonstration of Spee-Dee, the wonderfully effective cleanser which is being marketed by the States Chemical Co.

The snow-white cotton floor covering and draperies in the background offer an impressive reminder of the cleansing qualities of Spee-Dee.

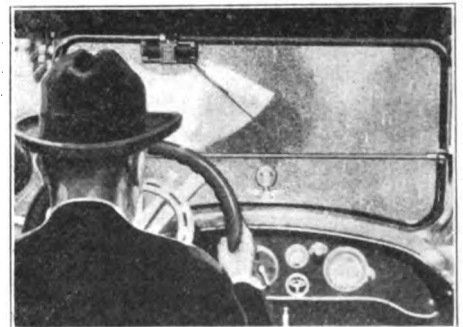
and grime from the hands instantly; afford a quick and most effective way to remove oil, tar, grease and dirt of every kind from automobiles, wagons and parts.

This remarkable cleanser for many purposes is manufactured by the States Chemical Co., 680 W. Austin Ave., Chicago.

Automatic Windshield Cleaner Is Operated from Engine.

The feature about the Mayo-Skinner automatic windshield cleaner that will most appeal to the motorist is that it is automatic.

Simply by turning a button the little vacuum motor of this automatic wind-



Windshield Is Cleaned Automatically.

shield cleaner starts to work. Back and forth the cleaning arm goes, as if by magic, cleaning constantly and steadily.

The Mayo-Skinner automatic windshield cleaner works by suction from the automobile engine. There is nothing about it to get out of order and it requires no adjustment whatever of the engine, and it is claimed that it cannot interfere with the efficiency of the engine.

The installment of the Mayo-Skinner automatic windshield cleaner is so simple that it can easily be done by the motorist without the aid of a mechanic. The little vacuum motor is attached to the top of the windshield frame. A specially selected



Main Display Window of Jackson Motor Co., Pittsburgh, Pa., Which was Devoted to Display of Spee-Dee.

was incorporated in 1920 for \$200,000 for the manufacture of the Little Jeff plug and another patented accessory of which Mr. Cotton is the patentee. This company was

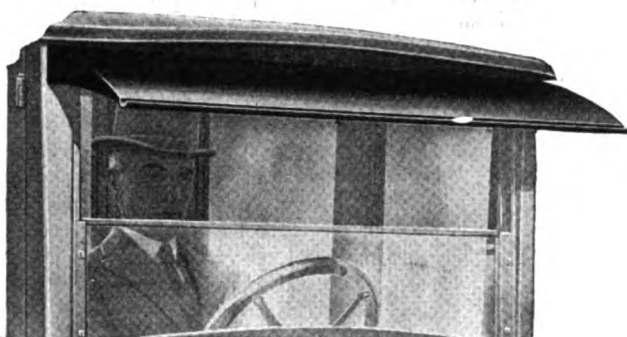
Interesting placards here and there in the exhibit remind prospective purchasers of the rapidity with which Spee-Dee works.



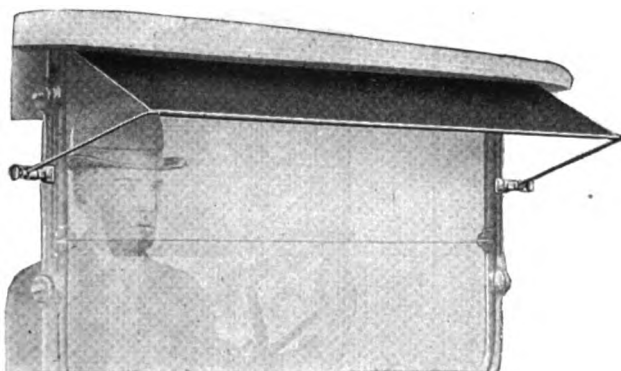
(By the Makers of VULCAN SPRINGS)

VULCAN VIZORS

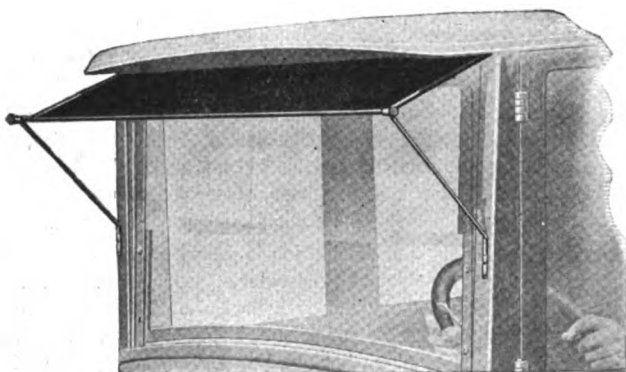
Prove Their Value



Type A, universal, fixed type for all closed cars with straight fronts.



Type B, universal, adjustable type for all open cars.



Type C, universal, adjustable type for all closed cars.

VULCAN VIZORS prove their value by their quality construction, conforming in every way to time-honored VULCAN standards; by their adaptability to any car; by their logical price based on present-day costs; and by their liberal profit to the dealer.

We know they are worth making and advertising. You will find them very well worth selling.

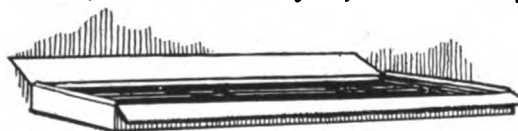
Type A is a fixed vizzor for all straight-front closed cars. It is easily attached, vibrationless, and merges into the lines of the car, improving its appearance.

Type B is adjustable, and fits all open cars. It folds into the top when top is lowered and can be adjusted to the driver's vision with two thumb nuts.

Type C is adjustable similar to type B, fits any closed car.

VULCAN VIZORS are made of the very highest grade Armco automobile sheet steel, and are handsomely finished in baked black enamel of a special dull satin effect. We are marketing these vizors on a strict policy of satisfaction or no sale. There is a liberal discount to the dealer.

If your jobber cannot supply you with genuine VULCAN VIZORS, our name on everyone, write us—today.



Packed in individual corrugated fibre carton, with necessary screws and simple instructions.

JENKINS VULCAN SPRING CO.

Richmond, Ind.

Branches:—Boston, Mass., 819 Boylston St.; Dallas, Tex., 2216-18 Commerce St.; St. Louis, Mo., Main & Cedar Sts.; San Francisco, Cal., 1035 Polk St.

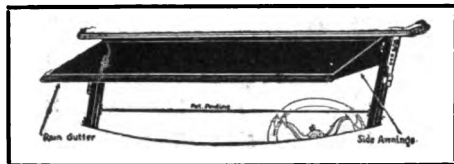
V7

tough rubber tubing connects the motor to the engine, the connection being made either to the intake manifold or the vacuum feed.

Full particulars may be obtained by writing to the Mayo-Skinner Mfg. Co., 2115 Elston Ave., Chicago.

New Automobile Vizor Sheds Rain Like Prow of Boat.

An automobile visor that "sheds the rain like the prow of a boat" is the latest offer-



Sheds Rain Like Prow of Boat.

ing of the New Era Spring & Specialty Co., Grand Rapids, Mich.

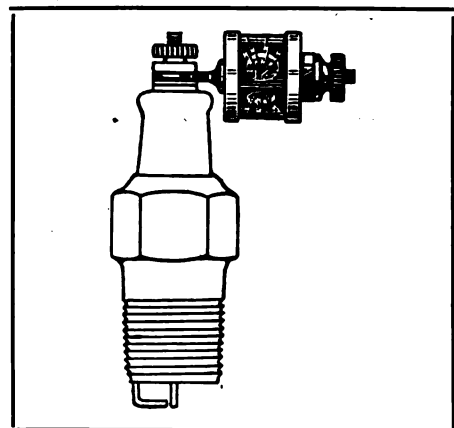
The new visor, which is made of an unusually heavy grade of pressed steel, is provided with a gutter at its lower edge into which the water flows and is thus carried to the ends of the visor, whence it flows off and past the sides of the car instead of blowing back on the upper half of the windshield.

Both ends of the visor are provided with a metal awning, or gable end, which overcomes the tendency of the rain to eddy around the ends and wet the windshield glass—usually at the spot just in front of the driver's eyes.

One of the best things that can be said about the New Era is that it works. And that's what the New Era people claim for it, in addition to the further detailed facts of heavy baked-on black enamel on the top and a dull green finish underneath, together with its easy adjustability to the height of the driver's eyes when installation is made, which also is very easy.

Try the I-X-L for Spark-Plug Troubles.

"I excel"—that's a big order, but when one reads of the many good features said to belong to the I-X-L spark-plug intensi-



Eliminate Spark-Plug Troubles With I-X-L Intensifiers.

fiers, one is inclined to agree that they would be splendid adjuncts to any car.

Some of the claims for them are: That they will enable the car owner to get satisfactory results from a plug which is worn out or on which the insulation is broken; that they will make plugs that are fouled with grease or carbon, or have broken porcelains, fire perfectly; that they save gasoline, prolong the life of spark-plugs, give more power and eliminate carboring of the engine; and that they are excellent trouble finders.

It is said that, when these intensifiers are used, one is able to tell instantly whether the magneto is working properly, a wire short-circuited or broken, or the batteries out of order, simply by raising the hood and watching the spark in the glass cylinders. If the spark does not show, then the battery or the magneto is not delivering the current to the intensifiers.

It is further claimed that the visible spark is a wonderful aid in timing the motor—that it becomes a window in the cylinder. The spark can be seen from all angles.

Write the Universal Mfg. & Sales Co., 550 W. Harrison St., Chicago, for complete information regarding these new aids to motor ignition.

Coupon Books Save Bookkeeping and Please Customers.

There is an increasing tendency among the most progressive businesses to reduce and simplify bookkeeping to the greatest possible degree. The reason is obvious. The simpler the system can be made, the fewer the opportunities for errors.

A system by means of which a considerable amount of bookkeeping and record forms can be eliminated is offered by the use of the exceedingly convenient coupon books manufactured by the Southern Coupon Co.

These coupon books are designed for issuance to customers, the coupons to be used in exchange for gasoline, oil, supplies and accessories.

A coupon book has no value whatever until issued, countersigned and dated. If lost or stolen, it has no value. When issued, it must be accounted for by a signed receipt, this receipt being numbered to correspond with the number on the front cover of the book and each coupon in the book, leaving no opportunity for carelessness or dishonesty.

At any moment of the day every coupon on hand can be invoiced and all others accounted for. The individual coupons are worthless except as presented in the original book of which they are a part. The owner of the book is interested only in getting the merchandise due him in return for the coupons surrendered and when so surrendered the coupons are of no value to the clerk who detaches them or to any other person into whose hands they may

fall. Consequently, they go into the only logical place for them—the cash register.

The correctness of every book is guaranteed—a factor of importance, both to you and to your customers.

The material used for the book covers is of pure, all-jute stock and is sweat-proof. The coupon paper is specially made, bearing the watermark "Sococo" on every page of coupons, thus affording protection against counterfeiting. Cardboard coupons can be furnished at slight additional cost.

By making it possible to place one's business on a cash basis, simplifying bookkeeping and eliminating petty charges, as well as encouraging sales and avoiding waste of time, these coupon books relieve you of many annoyances.

Write the Southern Coupon Co., Box 1472, Birmingham, Ala., for descriptive circulars and other details.

Handy Kit Box Contains All Tire-Valve Accessories.

Motorists who value mileage to be obtained from tires when properly cared for will welcome the announcement by A. Schrader's Son, Brooklyn, N. Y., of putting on the market a small kit box which contains every accessory that has to do with a tire-valve and is designed to do away with tire trouble.

In addition to a box of valve-insides, the kit contains a set of Schrader Kwik-On-Off dust caps, a set of rim-nut



Contains Every Accessory Having to Do With Tire-Valve.

bushings, five valve-caps, a valve-repair tool, a pump connection which permits the testing of the tire inflation without disconnecting the pump from the tire, a wrench for the tightening of the hexagon nuts at the base of the valve stem and a Schrader universal tire pressure gage.

The kit, which is described as a Schrader universal tire-valve, spare parts and accessory kit, is being offered at a very reasonable price and, being covered in imitation leather, makes a very acceptable gift for presentation to a motorist.



"The Eyes Have It!"

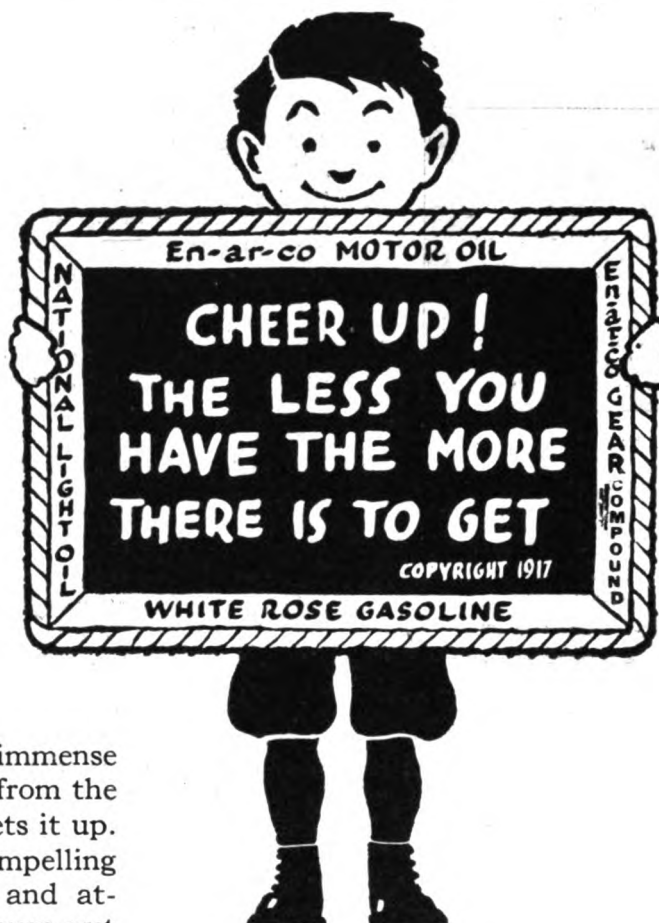
The Boy and Slate Sign Gets the Eye—Makes Sales

ALL eyes are on this immense Boy and Slate sign from the moment the dealer sets it up. It is the greatest attention-compelling novelty—the most unusual and attractive advertising device ever put out.

The size of it (over six feet high) won't permit of a passer by, on foot or otherwise, getting by without seeing it. It is made so that "those who run may read." Every other day you chalk in a new saying on the big slate. We supply you with enough of these sayings to last a year. These epigrams, or sayings, are snappy, clever and funny. This keeps people looking for them; it keeps the sign new; it gives you and your business a progressive, up-to-the-minute character.

This kind of advertising attracts people to you and makes sales for you. It's the kind of advertising that stays and pays.

The Boy is over six feet high—painted in brilliant colors, cut out all around and mounted on frame work so that you can stand him where he will get the most attention. It's a winner.



How to Get This Sign

Write to us for our offer and full particulars about the "Boy and Slate" service, and for prices and other selling helps on En-ar-co Motor Oil, En-ar-co Gear Compound and other En-ar-co brands. Remember we furnish the sign and enough slogans for the entire year. Get this offer—use the coupon.

The National Refining Co.

NATIONAL HEADQUARTERS

E-731 National Building, Cleveland, O.

4 Modern Refineries 92 Branch Offices

THE NATIONAL REFINING COMPANY
E-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

I now sell.....oil.

Here and There in the Motor World

Wheeler-Schebler Co. Announces Appointment of Sales Manager.

Announcement has been made by the Wheeler-Schebler Carburetor Co. that George T. Briggs is again connected with its organization in the capacity of general sales manager.

Mr. Briggs was associated with the Sin-



Geo. T. Briggs. Again With Wheeler-Schebler Co.

clair Refining Co. as manager of the automotive division, and more recently as general manager of the Motorcycle and Allied Trades Association.

The Clark-Turner Piston Co. Incorporates.

All things, big and little, must have a beginning and since the automotive industry at large has undergone an unparalleled development during the last 20 years, there are naturally many instances of unusual growth among concerns manufacturing or selling automotive products.

However, aside from war-time activities and exclusive of those factories mobilized by the government for the production of munitions, automotive machinery and incidentals, we have been much impressed by the rapid growth of the Clark-Turner Piston Co. within the past two years.

Previous to August 1, 1919, Edward W. Clark, an engineer and inventor of long experience, was manufacturing and supplying De Luxe light weight gray iron pistons in a small way in and around Los Angeles.

His product and its performance attracted the attention of Stanley S. Turner, at that time distributor for a well known automobile, and so thoroughly was Mr. Turner sold on the merits of De Luxe pistons and their performance that he immediately disposed of his automobile busi-

ness and joined Mr. Clark in the organization of the Clark-Turner Piston Co., starting August 1, 1919, as a co-partnership.

Then De Luxe pistons were placed on the market nationally, meeting with so ready and satisfactory a response that plans were at once laid for the development of a large business. From August, 1919, to June, 1921, the concern grew from a mere handful to over four hundred employees requiring during that time numerous additions to the original factory and finally being forced to purchase a site and to erect a large and modern factory. In that time a tremendous demand for De Luxe pistons was built up, a demand extending not only to every section of the United States, but to Mexico, Canada and many foreign countries as well.

Such a business and organization could have been built upon one thing only—results—and results, backed by intelligent and well placed advertising, a determination to give service, and a definite and broadminded business policy.

In the history of the growth of American business concerns, it is singular that in almost every case great expansion has come only after incorporation, seeming to prove the theory that any other form of business organization has its limitations. Accordingly, with the idea that the surface of possible business for De Luxe pistons has hardly been scratched and that they were just beginning to grow, and believing that the corporate form of organization would give a much broader scope and permit many things in the way of development not possible as a co-partnership, the Clark-

Turner company are Edward W. Clark, president, Stanley S. Turner, vice president and general manager, Fred C. Galloway, secretary and treasurer, having an active board of directors.

As great as has been the success of this concern, plans are being laid for an unlimited development and, in the words of Stanley S. Turner, "What has been done is only a starter."

The modern new factory, shown in the illustration, has a floor space of approximately 50,000 square feet, with ample room for further development. Since moving into the new plant, the production of De Luxe pistons has been tremendously increased, which promises unusual service facilities to distributors, dealers and owners.

National Cash Register Company Installs New Officials.

Announcement has just been made of three important changes affecting leading executives of The National Cash Register Co.

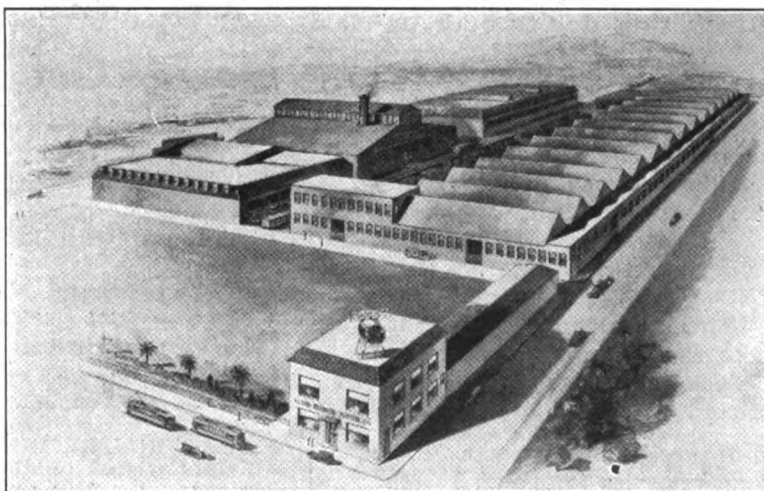
John H. Patterson has resigned as president and general manager, but will continue actively in directing the affairs of the company. As chairman of the board of directors, Mr. Patterson will advise the directors and help to formulate the policies of the company. His son, Frederick B. Patterson, was elected to succeed him as president, while J. H. Barringer was made general manager.

John H. Patterson has been president of The National Cash Register Co. for 37 years. He is regarded as one of the country's greatest business leaders. The institution he has built in Dayton is considered one of the world's model factories.

Fred B. Patterson is 29 years old. His first work was on a farm. He attended school for two years in England, and has been connected with the N. C. R. for 11 years. He has been taught the principles of business by his father, learning the N. C. R. business from the ground up. He started in as a workman in the foundry.

J. H. Barringer, the new general manager, was promoted from the ranks. He

started with the company 14 years ago, holding a minor position. He earned promotions very rapidly and, in 1918, was made first vice-president and assistant general manager. He is only 38 years old.

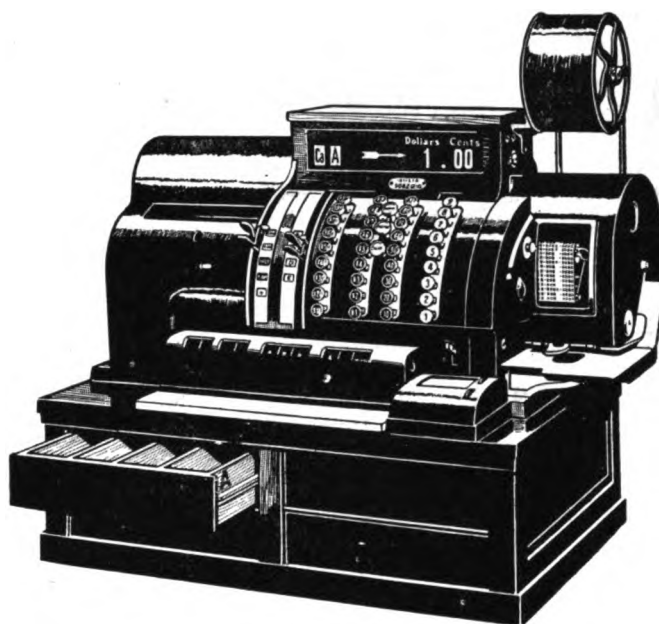


Think of It! 50,000 Square Feet of Floor Space—New Factory of Clark-Turner Piston Co.

Turner Piston Co. applied for and was granted a charter by the secretary of state of California and, therefore, became incorporated in June, 1921.

The capital stock is \$1,000,000. The offi-

Merchants need National Cash Registers now more than ever before



- ① They stop mistakes.
- ② They stop losses.
- ③ They decrease expenses.
- ④ They improve trade.
- ⑤ They increase profits.

We make cash registers for every line of business.

Priced \$75 and up.

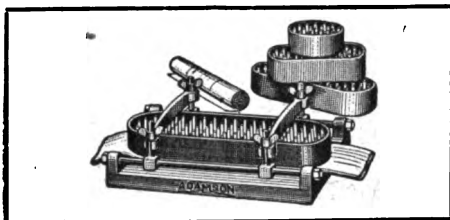
Easy payments. Liberal allowances for old registers.
Old registers bought, sold, repaired, and exchanged.

NATIONAL CASH REGISTER CO. DAYTON, OHIO.

Up-to-the-Minute Garage Equipment

You'll Like Tire Repairing if You Use an Adamson Vulcanizer.

"Say, Dad," said Jim, as he tossed the damaged tube upon the work table preparatory to beginning the task of mending it,



Adamson Vulcanizer Invaluable Aid in Tire Repairing.

"repairing these tires is about the most tedious job around the shop, I'll say."

"You're right, son," replied the father. "Never liked it myself. Still, it has to be done, you know."

"I know," agreed Jim, "but it does seem to me there ought to be some easier, quicker way to do such work."

Just then the postman walked into the shop with the morning's mail. Jim reached quickly for the magazine tucked in among the packages of letters.

"Hurrah," said he, "here's the AMERICAN GARAGE & AUTO DEALER. Maybe I'll find something that will help me in fixing that Davis car. If I do—well, I'll be jigged! Look, Dad, here's the very thing we've been talking about. Look at that!" And he pointed to an illustration on the magazine page showing a compact, well-built looking little machine, bearing the name "Adamson" across the front.

"What is it?" asked the father.

"Why," answered Jim excitedly, "it's a vulcanizer, and it says here that you can repair a 12-inch long cut in 15 to 20 minutes. All you have to do is to place the proper amount of gasoline in the vulcanizer and ignite it, and you don't have to pay any more attention to it because it is entirely automatic."

"It says, also, that there are over a million Adamson vulcanizers in use, and that not one has failed to give pleasing results."

"You prepare the patch just as we always do and put the proper size cup directly over the repair. You don't have to use any steam or electricity at all—just the gasoline—and it says you can't burn or ruin the tires. Say, Dad! let's get one. Just think how much time we'd save. I believe we'd do better work, too."

"All right," said the father, "the price certainly seems fair enough. Where it is made, Jim?"

"The Adamson Mfg. Co., East Palestine, Ohio, makes them," answered Jim. "I'm going to go right now and write the letter,"

and, being the kind of a chap with whom it is the rule to carry out a plan as soon as made, he did just that, and before many days the new machine was being exhibited to friends and customers who came to the shop.

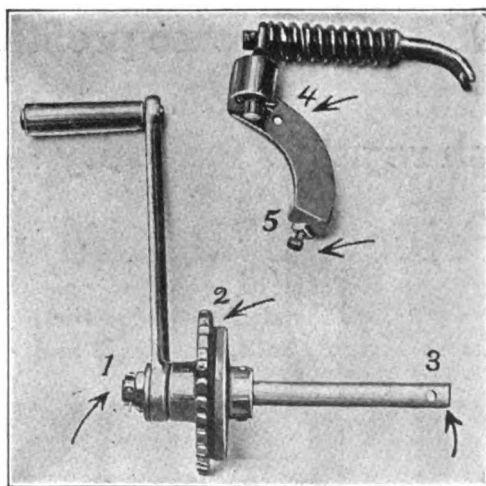
"It certainly does help us greatly in our work," says Jim's father. "The boy has a wise head on his young shoulders," he adds, looking at his boy proudly. "He saw what a good thing it was as soon as he read about it."

And Jim, smiling slyly to himself, thought: "Good thing Dad doesn't know that the thing I was thinking most about was that it would help me to get the work done more quickly so maybe I could get to a ball game a little oftener. But, say, I didn't have an idea what a happy thought I was having then."

Buffum "Kant Kick" Crank for Fords and Buick Valve Remover.

A new and practical device for owners of Buick cars and repairmen is the Buffum Buick valve remover.

Those who have been using screwdrivers and crowbars to pry the valve assembly from the Buick motor know that such a method often results in bent washers and valve stems, a broken valve cage or bent valve springs. All of these things may be avoided, it is claimed, when the Buffum valve remover is used. You can have clean valves easily and quickly without the danger frequently caused by the use of improper tools. Clean valves, of course, mean a saving of gasoline that

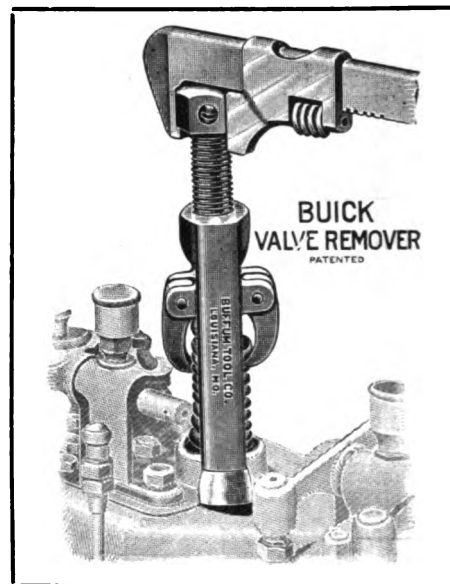


"Kant Kick" Makes Cranking Ford Safer.

will be gratifying to your customers.

The Buffum Buick valve remover applies the pressure directly underneath the cap washer and the key. The pull is delivered "straight up."

It is guaranteed to be free from defective material, and is built strong enough to withstand the use for which it is intended. Being light and compact, it can



Buffum Remover Avoids Damage to Valve Assembly.

easily be carried in the tool box, occupying no more space than an ordinary wrench.

Another excellent tool is the Buffum "Kant Kick" crank. Many a Ford owner has had a broken arm through the crank striking it when the motor back-fired. With the "Kant Kick" crank, it is said that there is no possible chance for the crank to slip out of the hand, whip all the way around backwards, and break an arm or a leg. The large number of teeth in the ratchet wheel allows the amount of back-kick to be only the distance of one tooth.

When the engine kicks, the dog on the ratchet holds the hand crank, while the leather friction clutch allows the engine shaft to turn, but without affecting or damaging the crank movement. This leather friction device, it is claimed, prevents breakage in the motor, such as breaking or straining the crankshaft, or even cutting off the large pin on the crankshaft.

The crank handle on this device is one inch longer than that on the regular Ford car, thereby giving more leverage and making it crank easier.

All cast parts of the "Kant Kick" device are of malleable iron. The device is guaranteed against any defects for a period of one year.

It is very light, weighing only nine pounds, and is packed in a specially constructed container, all ready for the dealer to hand or ship to his customer. Being

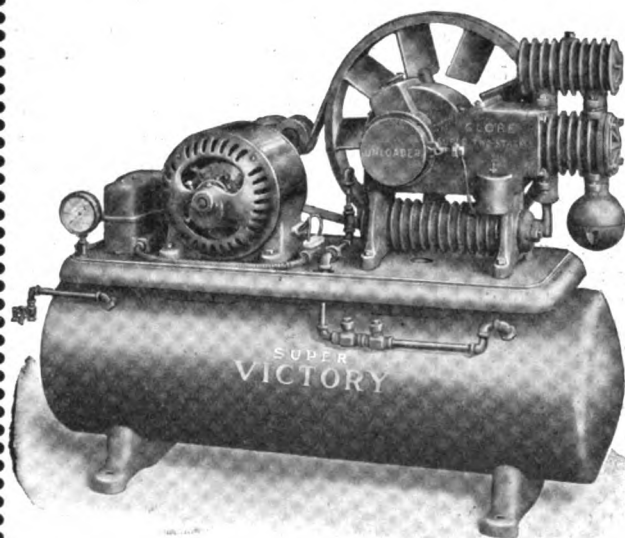
Are you still plugging along with that Old Compressor—

trying to fill giant pneumatics with an outfit built for handling small tires?

You can't hold business that way

Your first point of contact with the motoring public is through your free air service. Make that service count. Make it a profitable investment.

Do it with a compressor built for the job—not a mere attempted adaptation. The old type compressor was all right for small tires, but it won't stand up under **Pneumatic Truck Tire Service.**



Globe Super Two-Stage Compressors—designed especially for filling giant pneumatics—mean money in your pocket—every day in the year.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.



Better Ignition on less Voltage for Every Car

From a Packard Owner

Indianapolis, Ind.

"My first use of Radd Spark Plugs was on one side of a Packard Twin Six. As an improvement in ignition was immediately noticeable, I equipped the other side with the Radds.

"Since that time I have run the car 8000 miles without cleaning the Radd Plugs.

"I consider these plugs the best in every respect for all motors."

Edw. Schildhauer.

From a Ford User

Chicago, Ill.

"I purchased from you some time ago a set of Radd Spark Plugs for my Ford car. I consider these plugs by far the best plug on the market both from the standpoint of quality of material entering into the construction of them and the remarkable uniformity of action. They have never given one moment of trouble in five thousand miles and give better action to the engine in quick get-away and power."

Chas. W. Peacock.

No matter what the make or price of the car there is a RADD Spark Plug that will improve its ignition.

Other plugs require 50% to 60% more voltage to fire than the Radd. It produces a small spark in advance, aiding the discharge of the main spark. The result is a larger, hotter spark and an engine that misses less and runs smoother.

The RADD is the only plug—that eliminates the time lag from the spark—that has auxiliary electrodes which assist the discharge of the main gap—that will cause ignition at a lower voltage.

The RADD SPARK PLUG is guaranteed by us to be free of all defects in materials and workmanship—also electrical and mechanical defects.

Made in types, for all automotive needs.

DEALERS Sell the plug that serves best. Send in the coupon today.

LEICH ELECTRIC COMPANY

GENOA

ILLINOIS

Leich Electric Co.,
Genoa, Ill.

Please send us complete information and trade prices on RADD Spark Plugs.

Name

Address

assembled, the customer can attach it in 30 minutes, and so will not be bothered with assembling or have any chance to get it on the car wrong. It can be put on the car with scarcely any work. This makes it particularly convenient for the man who is not a mechanic, and the repairman or dealer can attach it to a car while the customer waits.

Both these tools are manufactured by the Buffum Tool Co., Louisiana, Mo., which also carries a very complete line of other high-grade garage tools, including the Buffum "Engineer Packing Tools," Buffum carbon scraper sets, Ford spindle bushing remover, Buffum "Boss" cultivator, Buffum curved bearing scraper-sets, garage and die makers' tong sets, etc. Those interested may obtain full particulars and circulars covering the Buffum line of tools by writing to the manufacturer.

Repairmen! Here Is a "Wonder Torch" and New Battery Molds.

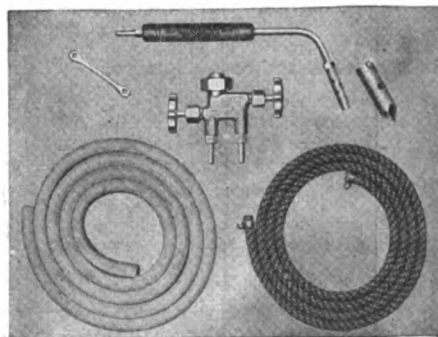
Users says that the Washburn torch is "the last word" in torches and that it is a wonder.

This little torch operates on Prest-o-lite gasolene and compressed air, and the tank attachment or mixing valve is easily adapted to an A, B or E size Prest-o-lite tank. The air may be derived from any air line furnishing 20 pounds pressure or from a small air tank with a foot pump.

The needle point flame is instantly adjustable, through a range of 4,000 degrees, it is claimed, without changing the tip.

Battery builders and repairmen will find this torch invaluable, either for the little soldering job or for heavy repair work. That "mean job" may be easily handled with the Washburn torch.

This torch may be purchased separately, or as a part of the Washburn soldering, brazing, lead burning and aluminum welding outfit, which consists of a Washburn torch, mixing valve (tank attachment),



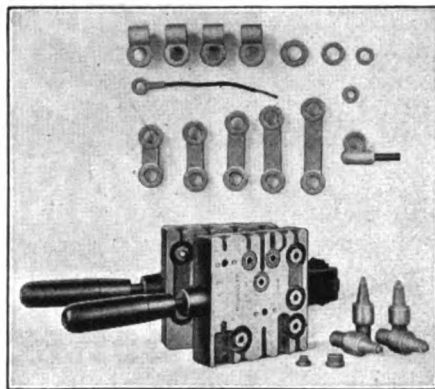
"The Last Word" in Torches.

soldering iron attachment, two six-foot hose length hose connections, and a Prest-o-lite tank key.

The Washburn Burner Corp., which manufactures the Washburn torch, also offers three types of battery molds which will be of interest to battery workers and repairshops.

One of these molds is known as the Link combination mold. This is made from fine gray iron, extra heavy, so as to render long and satisfactory service.

It will not overheat where speed is required, it is claimed, casting five of the most used connectors for all batteries, using standard jars, 7 to 15 plate. In addition, there are four end connectors (two Dodge and two standard tapers—negative and positive), one end connector with a 3/8-inch lead—used on 12-volt Maxwell and all other cars using a wire lead—and one



Link Combination Battery Mold is Complete.

small wire lead to connect with the end post on a storage battery requiring direct connection.

The post support rings fit the two sizes of standard rubber covers, and also fit perfectly all posts cast with the Washburn post mold. Two handy washers, sometimes badly needed when installing a new or rented battery, are also included.

Another of these molds is known as the "B" mold. This small mold casts five end connectors, including cable lead and two washers. It is offered to battery men wishing part of the combination mold. It has been found to be very speedy and popular, it is said, especially among smaller shops. All the features found in the large Link combination mold are found in the "B" mold as well, and the manufacturer states that the same care has been exercised in the manufacture of this mold as has been applied to the entire line of molds, which means time saving and satisfactory work.

The third mold is known as the Post strap mold. This is made from high-grade iron, carefully machined so as to produce perfect lead castings.

Several special features are embodied in this mold, rendering it unusually speedy and free from complications. The castings are easily removed, and the movable tooth rack enables the operator to cast odd and even number teeth on the post strap to receive the plates, correctly spaced for all standard batteries. When custom requires it, blanks may be cast by reversing ends.

Two bushings are furnished which are bored and reamed to standard post sizes, fitting the standard rubber covers which are commonly used by all repair-shops.

Further particulars concerning either the molds or the Washburn torch may be obtained by writing to the Washburn Burner Corp., Kokomo, Ind.

Make Your Oil Barrel an Efficient Oil Pump Outfit.

There is no gainsaying that the man who gets the business nowadays is the man who is prepared to render prompt and exceptional service. The "go-getter" is in the front row these days, but first—in the garage business as in any other business—he must have modern and efficient equipment.

We are glad to introduce to our readers the Boe repeater barrel oil pump as being worthy of their consideration as a part of the result-getting shop equipment.

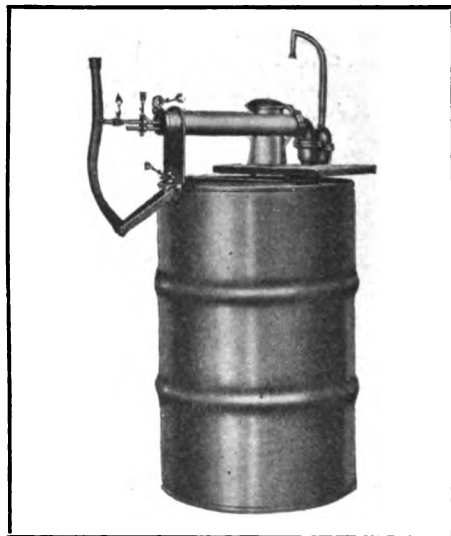
The Boe repeater barrel oil pump makes any oil barrel a high-grade oil pump outfit, it is said. It is designed for the quick handling of motor oil, kerosene, etc., and can be attached to the original oil barrel ready for business in a few seconds.

A wing nut locks the entire pump rigidly to the barrel, and it will fit any ordinary 20 to 55-gallon, upright or laydown, wooden or steel barrel.

This pump has the exclusive patented Boe leak-proof pump plunger construction. The expanding spring cups increase the life and efficiency of a piston plunger at least ten-fold, it is claimed, and insure perfect suction until the piston cups are completely worn out.

Another important feature is that the pump measures accurately one quart or one pint to each pump stroke.

The Boe repeater barrel oil pump can be




Makes Any Oil Barrel Efficient Pump Outfit.

almost instantly adjusted for Imperial or other foreign measuring standards if desired. The overflow drains back into the barrel from the large drain pan.

The pump can be securely locked by the aid of an ordinary padlock around the pump handle and through a ringed hook on the pump barrel head.

It is as simple as a cistern pump, and

Here !
Use
discretion



Don't Be a Mutt

You don't need to pay a big, fancy price for a good spark plug any longer. **Get a Little Jeff**

They sell at **Fifty-five Cents**
retail for . . .

Besides giving you the best plug for a lot less money, we send free with every Little Jeff Plug one Little Jeff Plug Cleaner. This simple and ingenious new invention enables you to clean a set of plugs in two minutes. We will send one Little Jeff Plug Cleaner FREE to anyone upon receipt of a five cent stamp to cover cost of packing and mailing.


Write us today for booklet and prices

GENERAL ACCESSORIES CORPORATION, Chicago

Write us today for
dealer prices

**GENERAL ACCESSORIES
CORPORATION**

Chicago



Makes Live Wires

Kester Acid Core Wire Solder puts **more** "punch and pep" into the work.

Converts hard soldering jobs into easy jobs—causes enthusiastic workmen—makes "run-down" cars act like new.

Thousands of garages are using and boosting **Kester Acid Core Wire Solder**. It's a great time saver because "the flux is in the pockets". Ready for instantaneous soldering.



CHICAGO SOLDER CO.
4210 Wrightwood Ave. Chicago, Ill.

Just the thing for mending broken wire connections. Use it on all of your repair jobs. It's for "all" around soldering.

CHICAGO SOLDER CO.
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder

Name

Company

Address

City State.....

Our Supply House is.....

Mail coupon for free sample—test it and be convinced (at our expense) that it's the best and quickest for you.

easily operated. There are no parts to wear out and no wasted energy, and its construction is simple, strong and durable.

Detailed information can be obtained by those interested by writing the Boe Mfg. Co., Minneapolis, Minn.

Small in Size But Mighty in Service —The HusKee.

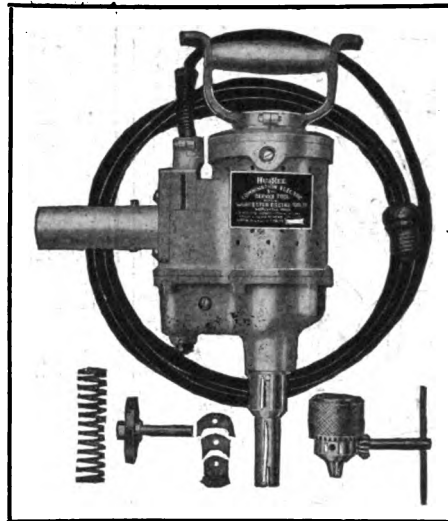
It's a husky helper is the "HusKee" 3-in-1 service tool—a combination drill and valve grinder which, it is said, is capable of handling 95 per cent of all shop work.

The drilling capacity of the tool is up to $\frac{3}{8}$ -inch in steel and $1\frac{1}{4}$ -inches in wood, and it will, it is declared, handle any valve-grinding job from a motorcycle to the largest truck or tractor. It may be used either as a stationary or portable tool for light emery grinding.

The construction of the HusKee 3-in-1 service tool is identical in every way with that of the well-known HusKee electric drill. The only addition is a device, developed and patented by the manufacturers, the Worcester Electric Tool Corp., Worcester, Mass., whereby there is combined in the one tool the oscillating (forward-and-back) motion of the valve grinder as well as the rotary motion necessary in a drill. To change from a drill to a valve grinder, one need only unscrew the drill chuck and slip on the valve grinder sleeve.

The HusKee 3-in-1 service tool was de-

veloped and tested for over two years in a hundred different service shops under actual working conditions before being



Will Handle Any Valve Grinding Job.

offered for sale to the automotive trade.

The Worcester Electric Tool Corp., Worcester, Mass., has an interesting trial offer. Details gladly furnished upon request.

New Curtis Two-Stage Air Compressor an Original Design.

Originality of design, as well as the embodiment of the best features of the two-

stage principle, are the claims made by the Curtis Pneumatic Machinery Co., of St. Louis, in connection with the new two-stage air compressor which it has recently placed upon the market.

This company has been building air compressors for over 26 years, and today is looked upon as one of the pioneers in compressed air.

The new Curtis air compressor includes the same fundamental features which established its single stage so firmly upon the market, and it has not only all the good features of the single-stage compressor but also important additional features.

The controlled splash, self-oiling system, says the manufacturer, is such that no excess oil gets into the cylinder and there is no external leakage or waste of oil, nor does the oil get into the tires. An enclosed crankshaft keeps out the dust.

Another interesting feature mentioned is the high and low level oil-filling gauge, which makes it possible to see at a glance the amount of oil in the crankcase.

With the exception of the precious metals, gold and silver, copper is the best conductor of heat. The intercooler of the Curtis air compressor is made of copper tubing with thin copper radiating fins rigidly tinned to the copper tube. The fan fly-wheel directs a blast of air against all the radiating flanges of the compressor and the copper intercooler.

V-Plex Piston Rings

Give new life to old engines

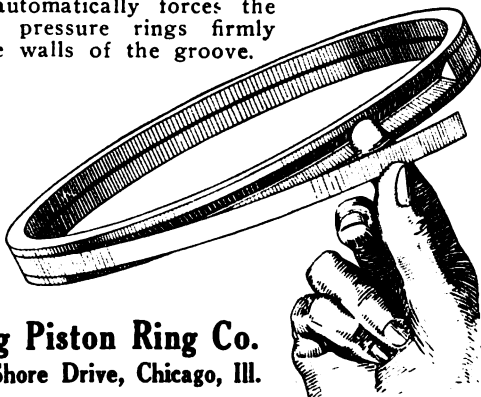
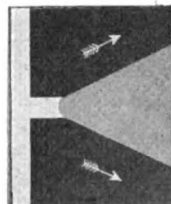
by fitting them with the piston rings that **always** keep the gas-tight seal intact and also keep down gas, oil and repair bills.

V-PLEX Rings have six pressure points, evenly distributed around the cylinder wall.

Note in the diagram how the wedge-shaped center ring of the V-PLEX automatically forces the two outer pressure rings firmly against the walls of the groove.

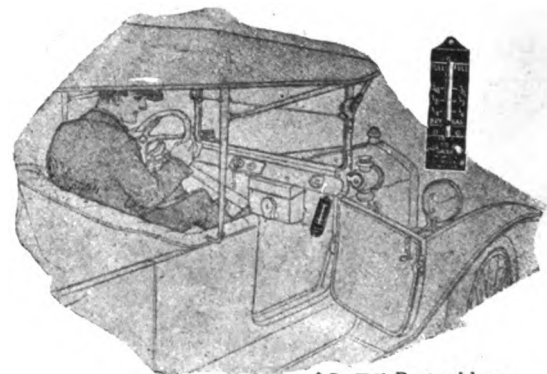
Sell the ring that every user is boosting. Our sales plan gives dealers exceptional co-operation and liberal profits. Write to us at once.

Krasberg Piston Ring Co.
536 Lake Shore Drive, Chicago, Ill.



FACE-TO-FACE VISIBLE GASOLINE GAUGE For Ford Cars!

The only scientifically correct and accurate gauge on the market. Registers in plain view of driver on dashboard. One of the most remarkable conveniences ever devised for Ford cars. Sold with unconditional money back guarantee.



\$3.75 Postpaid or
From Your Dealer

No Wires—
No Spirals—
No Corks—
No Air—
No Impractical
Devices

Agents—Dealers—
Salesmen

Write today for wholesale prices and exclusive territories. Nationally advertised. — Booklets and Circulars furnished.

Leitch-Nelson Co., 222 W. Congress, Detroit, Mich.



Flexlume Signs Give a Quality Background

CARS of quality need a fitting background. That is one reason why so many Flexlume Oplex Electric Signs are installed on the better class of showrooms. They are not only perfect day signs as well as night signs—raised, snow-white glass letters on a dark background—but they have greater reading distance, lower upkeep cost, better illumination, more artistic design and the added advantage that any trademark can be perfectly reproduced in raised Flexlume characters.

Let us send you a sketch showing a Flexlume Oplex Sign to meet the particular needs of your business.

FLEXLUME SIGN COMPANY
25 NAIL STREET BUFFALO, N. Y.
Flexlume—The electric sign made only by the Flexlume Sign Company.



Is A Wiring Job A Guessing Contest?

NOT FOR THIS MAN

Even if you or your electrical repair man are acquainted with the wiring of every current model on the market, you still need

The AUTOMOTIVE WIRING MANUAL

Only there will you find the means of repairing quickly and accurately the wiring or other electrical equipment of the obsolete models, orphans and strangers that are always cropping up. That means you can give your customers the sort of service they are willing to pay handsomely for, the kind of service they come back to get and send their friends to you for.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car or truck since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

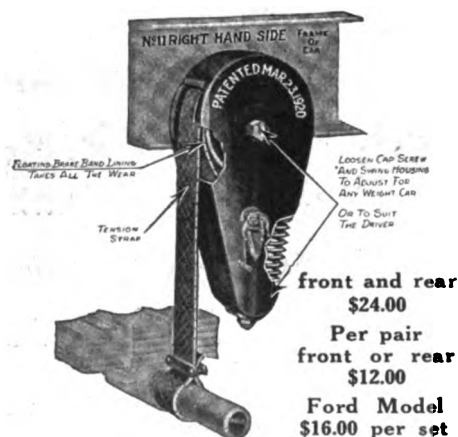
The profits on the first half dozen jobs the Manual shows you how to do are more than enough to pay for it. The rest of its big dividends are velvet. And the price is only fifteen dollars, delivered anywhere. Put a check in an envelope and start it to us right now.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.
41 E. 29th St., New York
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"BULL DOG" BOUNCE ABSORBERS



FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE. Easily attached; needs no oiling; has no metal parts that will wear or break.

JOBBER! DEALER! Write for liberal discounts.

CHANNON-HUGHSON COMPANY
225-231 West Erie Street... CHICAGO, U. S. A.



**Use
COUPON
BOOKS**

**They Encourage Sales--
Place Your Business on a Cash Basis**

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

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The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

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The valves are of light weight, large area, and can be inspected without removing the head or loosening a pipe connection or fitting. In order to remove the head, it is only necessary to loosen one gasket. A safety cage prevents the possibility of broken valves dropping into the cylinder and wrecking the machine.

There is also a hand unloader which permits the compressor to be started against full tank pressure, preventing burning-out of the motor, blowing fuses, burning or jumping of the belt.

The bearings are of modern, adjustable design, and die-cast of non-cutting white metal, and the crankshaft is drop-forged after which it is ground to size.

For further details, write the Curtis Pneumatic Machinery Co., St. Louis, Mo.,

Economy and Service Features of Polarstil.

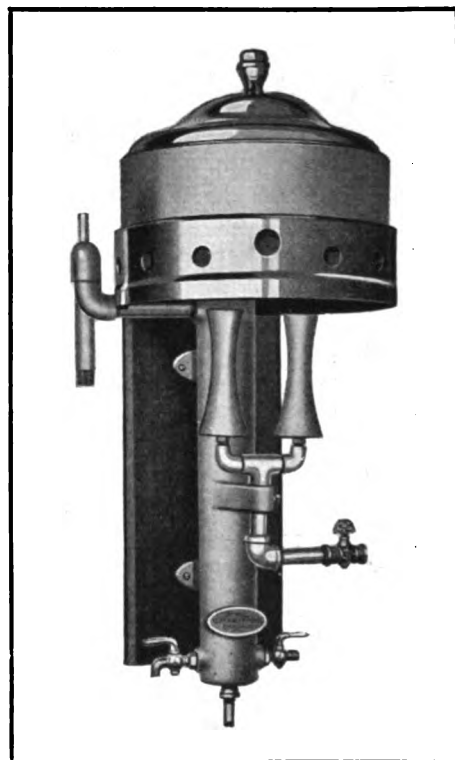
Every garageman and service station man recognizes the necessity of having a supply of good drinking water available for his trade. The tourist trade, particularly, appreciates this provision, and customers are sure to carry away with them a pleasant impression of the establishment which offers them, on a hot and dusty day, the refreshing cup of pure, cold water.

And it is absolutely essential that this water be pure as well as cold. For this

reason, distilled water is the most desirable. The Polarstil has been found exceptionally satisfactory for providing distilled water for drinking, chemical, pharmaceutical, surgical, storage battery and other particular purposes.

Polarstils are manufactured in a variety of styles and sizes, and for operation by steam, gas, gasoline, kerosene, electricity or stove.

Among the small types, the No. 111 has



Polarstil Offers Economy and Convenience.

proven to be a popular size. This has a capacity of one gallon per hour, and is equipped with gas burners.

The small Polarstils are made of cast iron for the body, but all parts coming into contact with the pure vapor or distillate, such as cover, condensing tube, etc., are copper brass tinned with pure block tin.

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The manufacturer guarantees that the distilled water produced will be free from mineral or organic matter, either in suspension or solution, and of the highest possible degree of purity and sterility for drinking, surgical, pharmaceutical, technical or manufacturing purposes; that it will not be flat or insipid to the taste, but equal to any of the best known natural table waters in palatability.

Write the Jewell Polar Co., 565-567 West Van Buren St., Chicago, for descriptive circulars and particulars regarding the Polarstils.

You never can tell when the BUFFUM PATENT BUICK VALVE REMOVER will come in handy

for, like the man with the gun from Texas, you don't need it often, but when you do you want it bad.

It is the only device that will properly remove the valve from assembly from the Buick motor. It is quick, sure and safe, obviating the danger of bending washers, valve stems and valve springs, or breaking the valve cage. The getting of any of these parts thus broken may lay up your car for days and weeks. Fits Buick motors of all sizes since 1912. Strongly built of the best materials, yet is light and compact

Every Garage and Repair Shop

should have a BUFFUM BUICK VALVE REMOVER as part of its regular equipment.

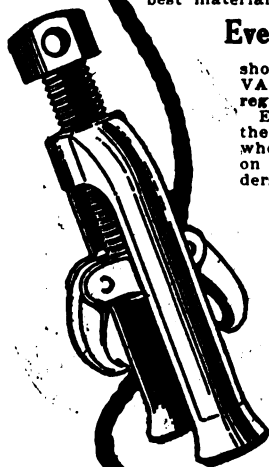
Every accessory dealer should carry them in stock to supply Buick owners who need them, and will buy them on sight. The sales and repeat orders have proven it a good buy.

Retail price, \$2.00 Fully guaranteed. Packed one in a box ready to hand customer

Use Buffum Auto Tools. "The Finest and Largest Line of High Grade Automobile Tools in the World."

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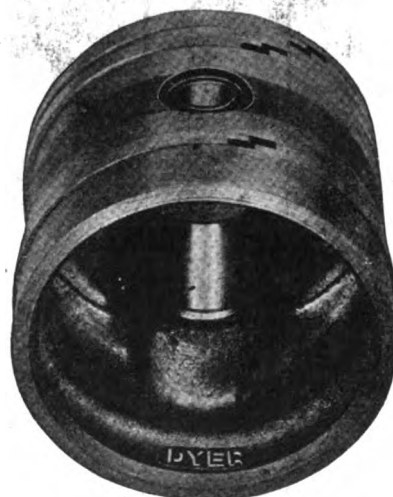
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A 40-page book of comprehensive data on Pistons and Piston Assembly parts, giving specifications of 800 models of motors in pleasure cars and trucks. Most complete guide of its kind ever published. Indispensable to cylinder grinding concerns, service stations and automobile repair men in general.

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Are in Demand Everywhere

Use F. A. A. MENDS in repairing scored Cylinders, Cracked Water Jackets and Aluminum Crank Cases. They give a solid and permanent result, that is associated with scientific welding.

When you are troubled with a Scored Cylinder, Cracked Water Jacket or Aluminum Crank Case, have it repaired with incomparable F. A. A. MENDS.

It achieves more and costs less than any other.

Give these MENDS a trial or ship your CYLINDERS or CRANK CASES direct to us—they will be returned the same day received.

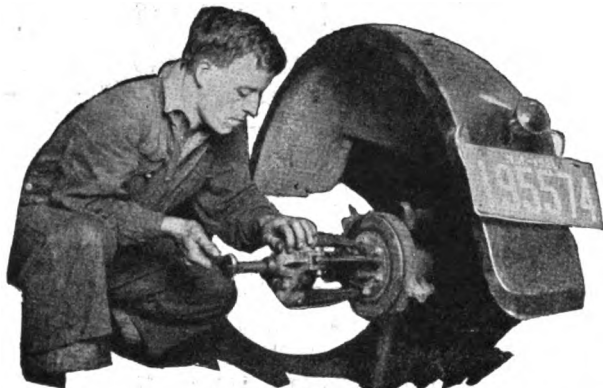
NO REGRINDING, NO NEW PISTONS, NO WARPING or CRACKING.

Let us send full particulars—Write today.

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BEACH PATENT



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A Greb always will. It's this versatility—ready ability to grip and pull in the almost impossible places—that makes Greb Automatic Grip Pullers so handy for shop equipment.

The wire wheel hub which this Greb is forcing off, as shown in the illustration, was stubborn in yielding to any other pressure. And it didn't afford any too much room for leverage. But the Greb, with instantly adjustable jaws, takes hold and hangs on until a few turns of the wrench have taken all the "fight" out of Mr. Hub.

Just three Greb sizes to handle all classes of work. Each puller comes to you with a full set of long and short jaws—really four pullers in one.

Send for information on our garage tools and equipment and our 10-day trial offer—ASK YOUR JOBBER

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We also manufacture the Greb Rim Tool for cross split rims (Price \$7.50) and the Greb Extractor No. E-10 for Hyatt Roller Bearing Sleeves (Price \$4.00)

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for service and reliability

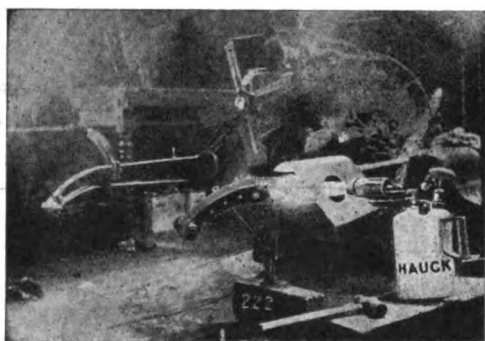
The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

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Write today and feel free to consult our Engineering Department.

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Twisted Chassis Straightened in 6 Minutes with a Hauck No. 14 Kerosene Torch

A piece of sheet iron bent in the manner shown in the illustration was used to confine the heat to the part to be straightened, which became cherry red in less than 5 minutes.

The powerful, blue-red flame of the burner is clean, without smoke or soot. The burner is made of special heat resisting metal, without coils. All the oil passages are straight and can easily be cleaned. The oil valve has a ball check to prevent the hot oils from the burner returning to the tank.

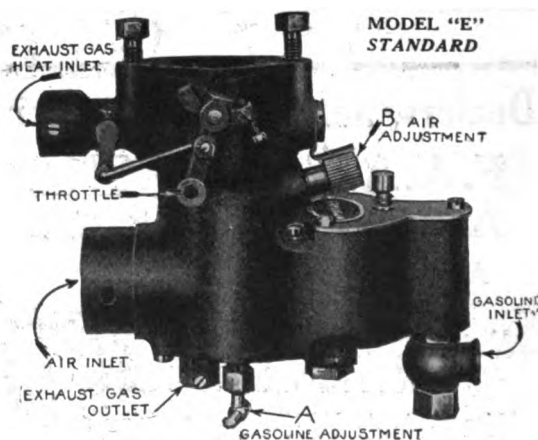
A new feature of the Nos. 14 and 15 sizes, is the priming pan valve.

Besides straightening, the Hauck Torches are used for expanding, brazing, soldering, preheating and melting babbitt out of bearings.

Write for prices and copy of Bulletin No. 104
"Quick Auto Repairs"

HAUCK MANUFACTURING COMPANY

126-134 Tenth Street, Brooklyn, N. Y.



MARVEL CARBURETERS

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Universal Satisfaction

POWERFUL—

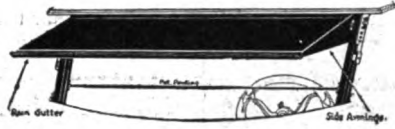
ECONOMICAL—

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Write for our new Catalogue

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It's Visor Time the Year Round

In rain, snow and sleet of winter, as well as in the glare of summer sunshine, the demand for a visor grows. The motorist who seeks a visor will find so many superior features in the New Era that your sales will be easy and every buyer delighted with his purchase. Rain gutter-awning ends—heavy metal throughout, price \$10.00.

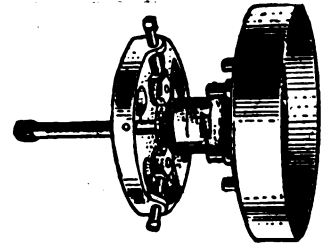
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New Era Spring & Specialty Co.
56 Cottage Grove Ave. Grand Rapids, Mich.

Manufacturers also of New Era Springs and New Era "Better" Bumpers

NEW ERA
DeLuxe VISOR
all metal

The F. & W. Universal Wheel and Gear Puller is the only tool made which can be fastened to the hub threads of any automobile.



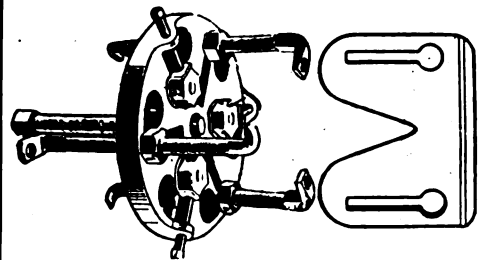
Strength and wide range of adjustment make this tool superior for gear pulling and arbor press work. Malleable plate for press shown at right of complete tool below. Note material used; heat treated nickel steel arms; hexagon blocks and large power screw are hardened malleable castings.

Each of the six sides of hexagon blocks shown above has different size thread for engaging any hub thread. Adjustable to hubs of various diameters. Any mechanic knows the advantage of pulling direct on hub instead of the old awkward method of hitching to spokes.

List price complete, \$32.00
Write for discounts.

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BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



BUTTERFIELD & CO.
COMBINED AUTO SCREW PLATE
1/4 5/16 3/8 7/16 1/2 5/8 3/4 S.A.E.
1/4 5/16 3/8 7/16 1/2 5/8 3/4 U.S.S.
WITH TAP WRENCH NO. 10.

Set shown in illustration enjoys a well deserved popularity in the automotive field. Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each. Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

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Save \$135 a Year on your Ford
Much more on other cars and especially trucks

ALSOP-ALL-SPARK

Is an indispensable part of your car

YOU CANNOT AFFORD TO BE WITHOUT IT
Best by Government Tests. This simple little device does away with spark plug and carbon troubles.



Saves gas, battery, oil, piston rings, repairs, depreciation, no overhauling on the road and many other advantages that spell car satisfaction. Send your order today—Circular on request.

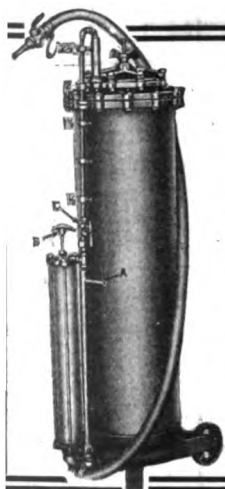
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Cost complete, with money-back guarantee \$7.50

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Operates by forced air pressure or by hand or by a combination of both.

Accurate as a scale. Adjustable "visible" measuring. Indicator "B" travels nearly 8 inches for 1 lb. or pt. Can be set to dispense any exact quantity desired.

Will handle 30 pounds of silent gear grease in one minute.

Ask about our 15 other pump outfits. Biggest line of its kind.

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CHALLENGE BATTERY PLATES

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For all Standard Makes of Batteries.

Guaranteed Two Years
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None Better. By Service Test

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Service Stations!! Be Wise!!

Build your own battery with CHALLENGE Plates and Separators and make larger profits.

Challenge! One hundred dollars' reward for a better plate chemically.

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For Those Who Know and Want the Best

REYNOLDS SPRING CO.

RED DIAMOND CUSHIONS

FOR FORD CARS

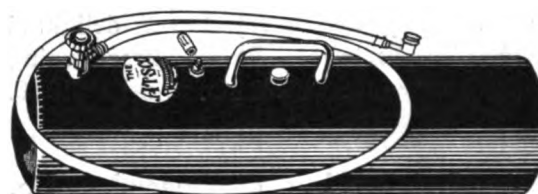
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Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.

Sold thru regular channels only.

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The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

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Pat. 3-19-'18.

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There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleaning the plugs and guessing which cylinder is missing.

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JOBBER and DEALERS—Your profit is liberal.
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installed in your garage will double your profits and give you a reputation for quick, accurate repairing.

The Storm Main Bearing Babbitting and Boring Tool



for Ford and Fordson Motors—puts in new, perfect bearings exactly the same as the original and in the proper position.

Write today for complete information

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Rose Tire Pumps, Rose Taper Nozzle Grease Guns and Rose Fil-A-Gun Grease Buckets are three sure sellers. They give you quick, steady sales with a good margin of profit. Every dealer should handle them. Write your jobber or us for attractive proposition on the Rose line.



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Laminated Shims are made of thin layers of brass, which are peeled off to secure the thickness required for accurate bearing adjustments. Furnished babbitt-faced or plain. In standard patterns or to order.

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**TO STAY
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Patented **O'BRIEN** HEAVY DUTY GREASE PUMP

PORTABLE—COMPACT

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Grease any transmission and differential in 3 minutes
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33x4	15.00	2.30
34x4	15.25	2.30
32x4 1/2	20.00	2.30
32x4 3/4	20.50	2.40
34x4 1/2	18.50	2.50
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Mail orders, \$2 deposit with each tire ordered, balance C. O. D. subject to your inspection. A trial order will convince you.

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put six cylinder smoothness into four cylinder motors, give any motor more power, more speed, quicker get away and more miles per gallon with less bearing trouble.

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keeps the motor cool, increases power and speed.

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Motors refined and tuned for speed. New and rebuilt motors in stock. Tell us your motor problems. Our increased equipment and space insures prompt service and perfect work.

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CYLINDER REGRINDING

Standard and Oversize

PISTONS

PISTON RINGS PISTON PINS
ALL WORK INSPECTED

With our **BU-NITE PISTONS**
Goes a **GUARANTEE**
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Standardized Prices
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One qt. kerosene and 6 lbs. air pressure cleans all dirt, grit and grease from engine. Prevents wear, actually saves half the usual repairs. Quick, economical, thorough, easy and cleanly to operate. Necessary for repair shops.
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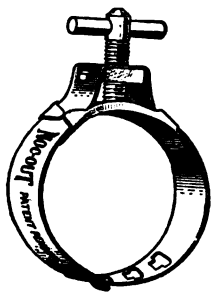
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furnish efficient protection for cars in dead storage. They are made of strong, heavy paper, properly reinforced, and in standard sizes to fit any car.

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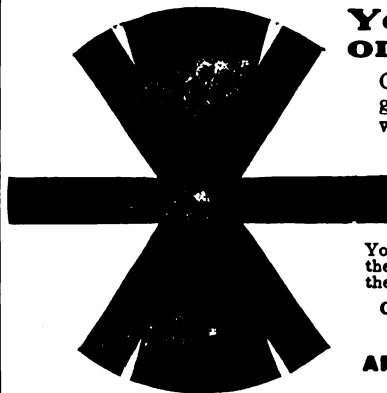
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Cylinder measurements guaranteed accurate to within .00025" and less.

**The AM-PE-CO
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You simply find the blade that fits the cylinder and *instantly* read the correct measurement.

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PRICE \$2.50

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Marshalltown, Iowa

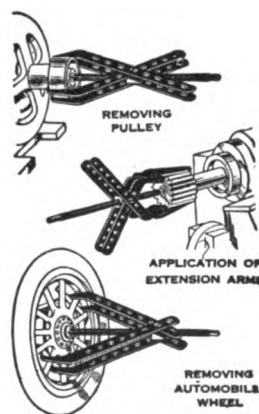
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WELDING EQUIPMENT

F. A. Albertus & Co., 206 9th St., Milwaukee, Wis.

Washburn Burner Corp., Kokomo, Ind.

Index to Advertisements

A

Adamson Mfg. Co. 5
 Air-Tight Steel Tank Co. 56
 Albertus & Co., F. A. 53
 All-Spark Ignition Co. 55
 All-Spring Shock Absorber
 Mfg. Co. 61
 American Bolt & Screw Case
 Co. 59
 Am-pe-co Sales Co. 59
 Atlas Auto Supply Co. 6
 Auto Specialties Mfg. Co. 5
 Automotive Publ. Co. 51

B

Bailey Co., Geo. D. 57
 Boddy, J. Newton. 56
 Boe Mfg. Co. 57
 Bowes Co., Robt. M. 57
 Brewer Specialty Corp. 62
 Brunner Mfg. Co. 53
 Buffum Tool Co. 53
 Burd High Compression Ring
 Co. Inside Front Cover
 Burgess-Norton Mfg. Co. 58
 Butler Mfg. Co. 55
 Butterfield & Co. 58

C

Catelain, Andre G. 58
 Challenge Battery Co. 56
 Champion Pneumatic Machin-
 ery Co. 6
 Channon-Hughson Co. 51
 Chicago Solder Co. —
 Clark Co., W. L. —
 Commercial Mfg. Co. —
 Curtis Pneumatic Machinery
 Co. 39

D

Dearborn Equipment & Hinck-
 ley-Meyers Co. 57
 Dickerson, C. A. 57
 Duntion Co., The M. W. 53
 Dyer Co., The. 53

E

Eclipse Valve Grinder Co. —
 Ever-Tyte Piston Ring Co.
 Inside Back Cover

F

Fairbanks Co. —
 Farmers' National Life Insur-
 ance Co. 58
 Federal Electric Co. 7
 Flexlume Sign Co. 51
 Foster Bros. Mfg. Co. 59

G

Ganschow Co., William. 54
 Garden City Spring Works. 59
 General Accessories Corp. 49
 Globe Mfg. Co. 47
 Graff-O Products Co. —
 Greb Co. 54
 Green Engineering Co. 58
 Greenfield Tap & Die Corp. —
 Greer College of Motoring. 58

H

Harvey Spring & Forging Co. —
 Hauck Mfg. Co. 54
 Hicken Sod-Tor-Lite Co., B. E. 61
 Hobart Bros. Co. —

I

Indiana Parts Co. —

J

Jenkins Vulcan Springs Co. 41

K

Kennedy Car Liner & Bag Co. 59
 Krasberg Piston Ring Co. 50

L

Laminated Shim Co. 56
 Leich Electric Co. 47
 Leitch-Nelson Co. 50
 Lewis & Milligan. 55
 Loudon, Inc. —

M

Magnet Light Co., The. —
 Marvel Carburetor Co. 54
 Marvel Machinery Co. —
 Mikesell Bros. Co. 61
 Motor Salvage Co. 58

N

National Cash Register Co. 45
 National Refining Co. 43
 National Rubber Filler Co. —
 New Era Spring & Specialty
 Co. 55

P

Paro, H. G., Co. 57
 Premier Electric Co. 59

R

Reynolds Spring Co. 56
 Romort Mfg. Co. 3
 Rose Mfg. Co., Frank. 56
 R. T. Mfg. & Sales Co. 59
 Rust Products Co. —

S

St. Paul Welding & Mfg. Co. —
 Sampson Electric Co. 59
 Sawyer-Weber Tool Mfg. Co. —
 Schrader's Son, Inc., A. 57
 Shaler Co., C. A. Front Cover
 Smith Co., The W. J. —
 Southern Coupon Co. 52
 States Chemical Co. 8
 Stiles Mfg. Co. —
 Storm Mfg. Co. 56
 Sunderland Machinery & Sup-
 ply Co. —

T

Taylor, H. D. Back Cover
 Trindl Co., The. 58
 Tungsten Mfg. Co. —

U

U. S. Air Compressor Co. —
 Universal Mfg. & Sales Co. 56

V

Van Trump-Eselbey Co. —

W

Wagner Specialty Co. 58
 Warshawsky & Co. 58
 Washburn Burner Corp. 4
 Webber Co., P. H. 6
 Western Rubber Mold Co. —
 W. H. S. Mfg. Co. 61
 Worcester Abrasive Co. —

Z

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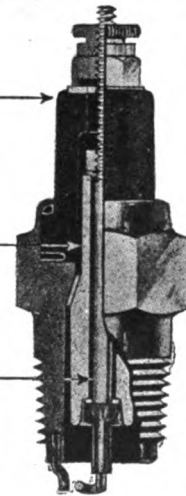
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POSSESSES HIGH
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Necessary for every shop. No torch to generate, Copper pointers
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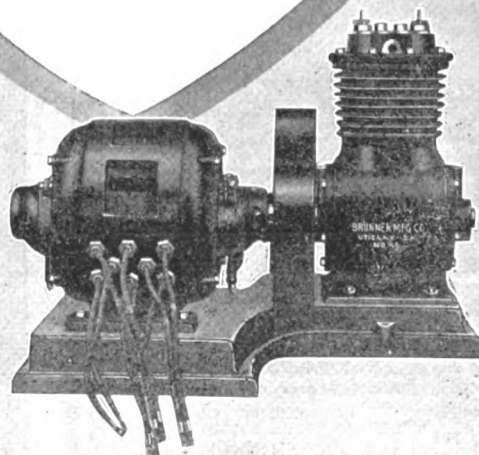
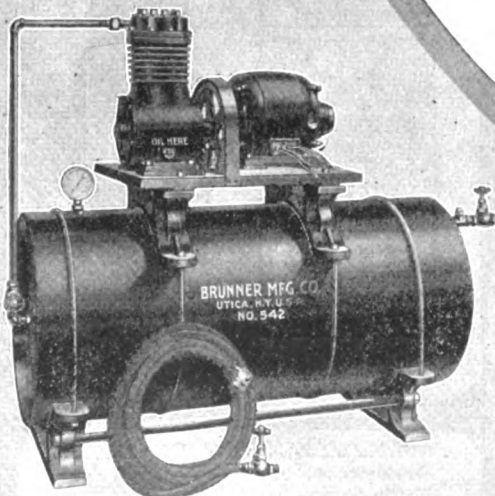
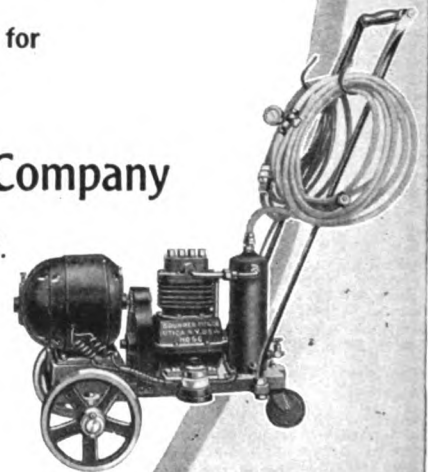
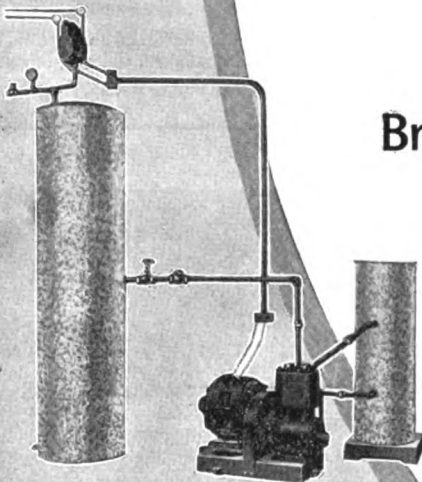
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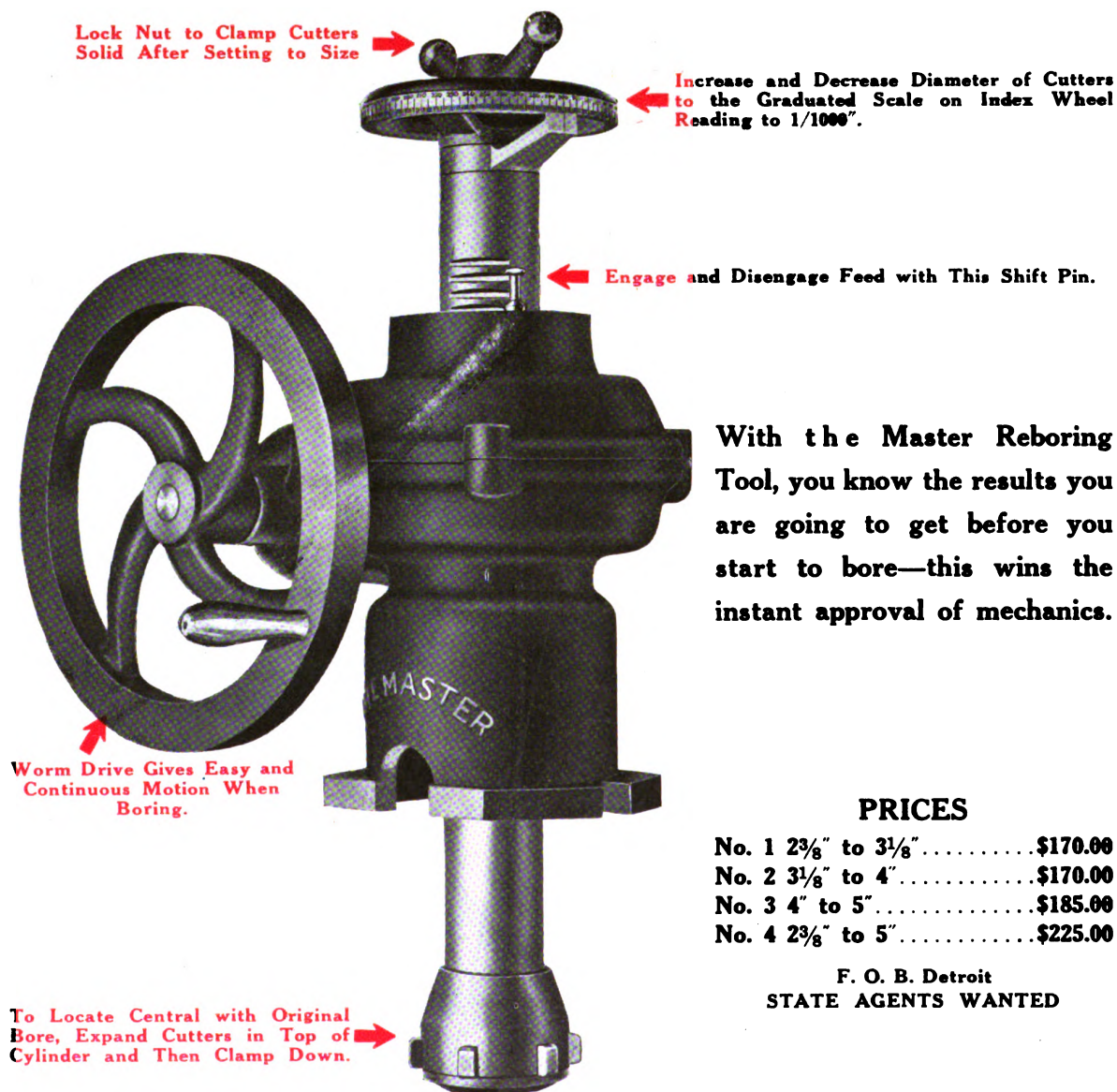
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American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

SEPTEMBER, 1921

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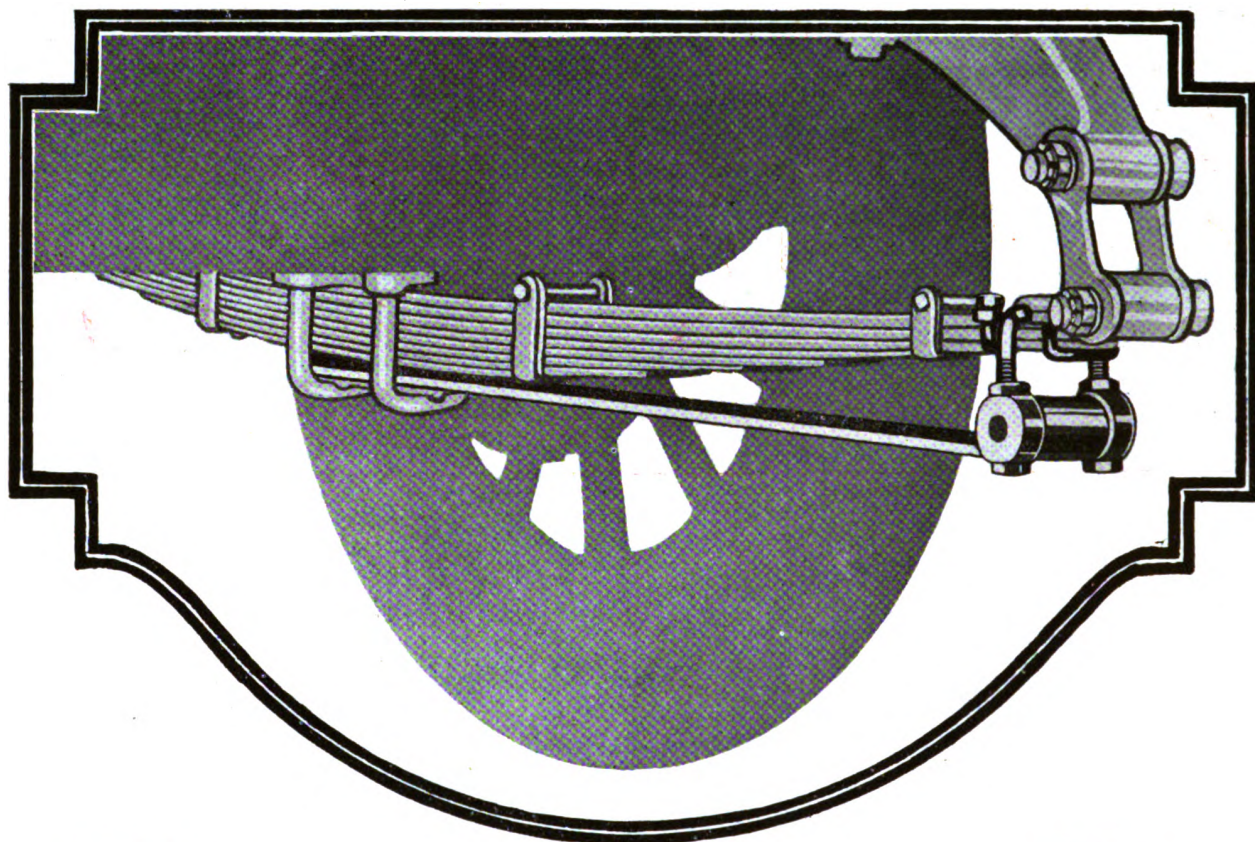
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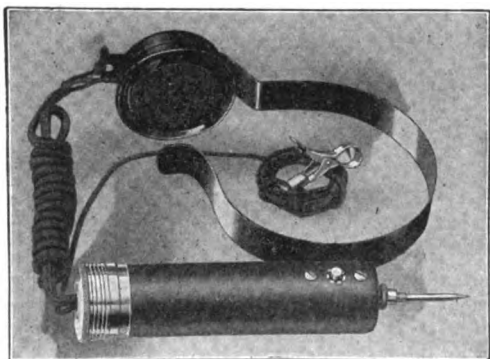


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Published Monthly

TABLE OF CONTENTS

EDITORIALS

"Service First" Wins!.....	9
Low Point Passed.....	9
Road-Building Prospects Good.....	10
Use Genuine Parts.....	10

GENERAL

"Outdoor Repairshop" Is Popular, by K. H. Lansing..	11
Meeting the Backyard Competition, by C. M. Adams	12-13
Let Your Windows Aid Your Sales, by Ernest A. Dench	14-15
Missis Hecker Gives Us a Party, by Frank Farrington	18-19
Is Storage of Gasoline a Nuisance? by Chesla C. Sherlock	21
Legal Rulings of Interest to Garageman, by R. R. Rossing	22
Importance of Suitable Lubrication, by J. N. Bagley	25-26-35-36
Better Driving Light at a Small Cost, by Robert Livingstone	27
Do You Read Your Trade Paper? by Frank E. Morris	28
Glimpses in the Garageman's World.....	29-30

DEPARTMENTS

Accounting, by J. N. Boddy.....	16-17
Welding, Cutting and Brazing Practice, by David Baxter	23-24
Practical Hints for Shop Mechanics.....	31-32
Readers' Questions and Answers.....	33-34
Accessories—Dealers' Key to Profits.....	37-38-40-42
Here and There in the Motor World.....	44
Up-to-the-Minute Garage Equipment.....	46-48-50-52

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A complete manual of the latest approved methods.

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New Type HM-7A

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For Any Open Head Motor — 4 Cylinder Blocks Completely Re-bored in 36 Minutes

This machine is built to handle the largest production and for the Service Station that demands absolute accuracy and perfection of finish with the minimum amount of labor. You can guarantee your reboring work when using this equipment.

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Cylinders easily placed on low table.

Pilot runs through the spindle and drops into a hardened bushing in the table.

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Stop collars automatically stop the machine at the end of the cylinder.

Produces a perfect finish on the cylinder wall.

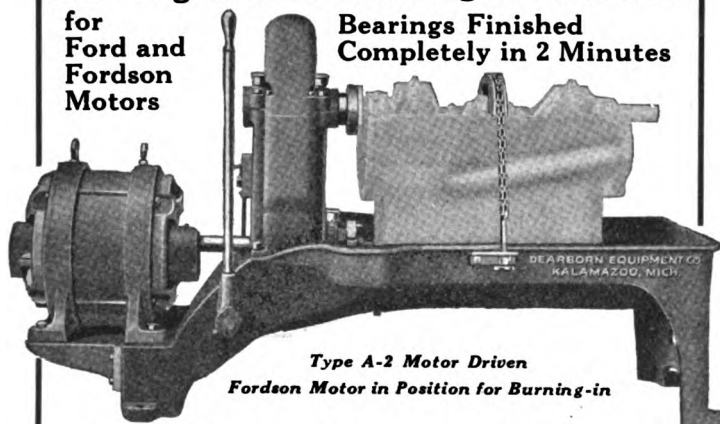
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Bearings Finished Completely in 2 Minutes



Type A-2 Motor Driven Fordson Motor in Position for Burning-in

This machine is the result of many years' experience in designing and building Ford Service Station Equipment.

It meets every requirement for producing the highest grade work at the lowest cost. Can also be adapted to other makes of motors.

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Ask for our Trial Proposition—making an actual demonstration of either of these machines in your own shop—if they make good you will be glad to keep them, if not, BACK they come at our expense.

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40 North Michigan Boulevard CHICAGO

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If it's a TEAR, a HOLE or RIP in your Auto Top—then there's a reason why you should have a BEATS-ALL TOP PATCH.

For repairing tears and holes, there is nothing like Stay-On Auto Top Patches. They adhere so firmly and permanently that they make the top as good as new.

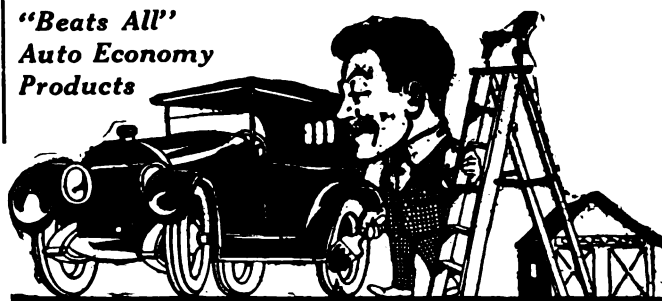
These patches are equally effective in repairing curtains and upholstery.

Stay-On Auto Top Patches come in sheets $3\frac{1}{2} \times 12$ inches—each sufficient to cut a number of patches of any size or shape. They are packed in display carton containing 4 Pantasote Leather, 4 Mohair and 4 Pebble Grain for Ford Tops. 50c ea. \$6.00 per doz. in display case.

DEALERS—Your customers will readily appreciate Stay-On Auto Top Patches and other "Beats-All" products as well. If you are not acquainted with this line, ask your jobber or write us for descriptive catalog.

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To that end we have developed CHAMPION Air Compressors to their present position of predominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

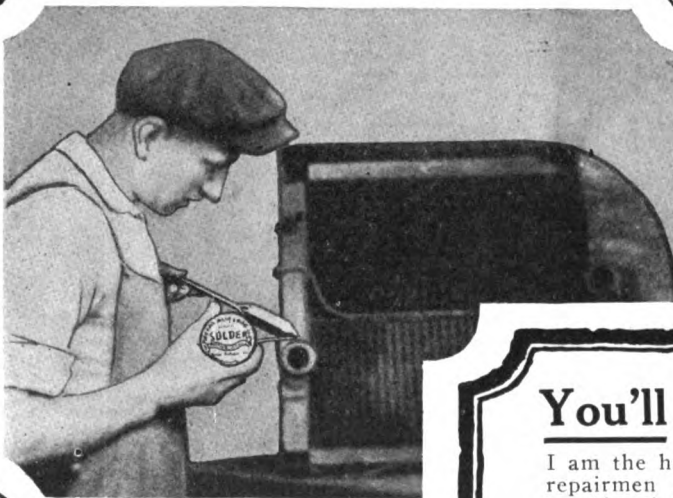
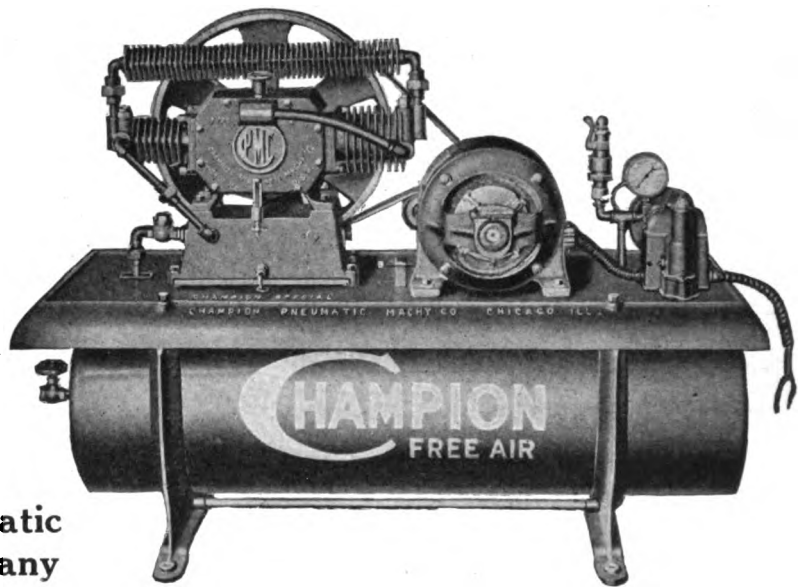
An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

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Chicago, Illinois



Soldering Radiators is just one of the "countless" jobs Kester Acid-Core Wire Solder will handle. It's so simple to use because it is a "self-fluxing" solder.

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I am the handy helper for thousands of garagemen and repairmen who call me "Pal". When they have car troubles they use me because they know from experience that I save time and trouble. Let me help you fix the disabled cars and I know that you will say, "Gee! We couldn't keep shop without



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Chicago, Ill.

Clip coupon and mail; entitles you to free sample.

Chicago Solder Co.
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Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

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City..... State.....

Our Supply House is.....

STOP THAT WASTE!

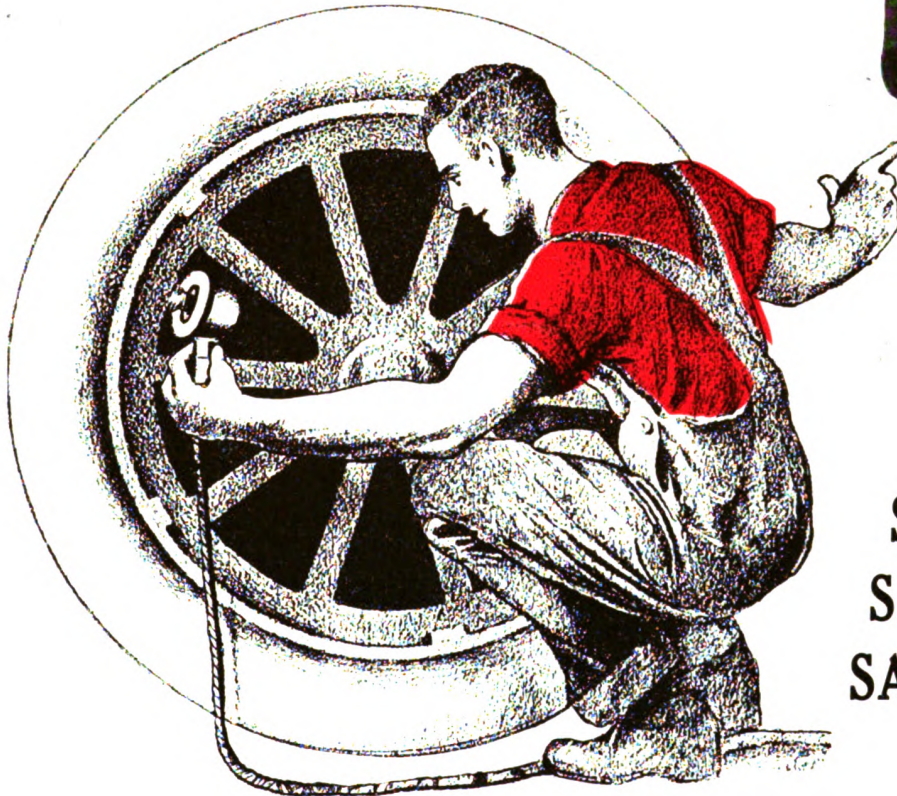
BY USING THE BEST "AIR CHUCK" ON THE MARKET

SCHRADER UNIVERSAL

Every garage, service station, repair shop, supply store—or, in fact, any place where an air line service for motorists is maintained—needs the SCHRADER UNIVERSAL "AIR CHUCK" right now!



Patented
July 23, 1918



**SAVES AIR
SAVES TIME
SAVES MONEY**

**Why the SCHRADER UNIVERSAL
"AIR CHUCK" should be used on
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BECAUSE the SCHRADER UNIVERSAL "AIR CHUCK" is the only Air Chuck manufactured which cannot injure the Valve Inside of the Tire Valve by bending the pin or distorting the spring.

BECAUSE it is absolutely airtight.

BECAUSE it is positively automatic in operation.

BECAUSE it is the most compact Air Chuck on the market.

BECAUSE rubber cover prevents marring paint or enamel on wheels or any other part of the car.

BECAUSE it costs less for replacement parts and repairs can be quickly made.

BECAUSE it is more convenient to attach and holds hose more firmly.

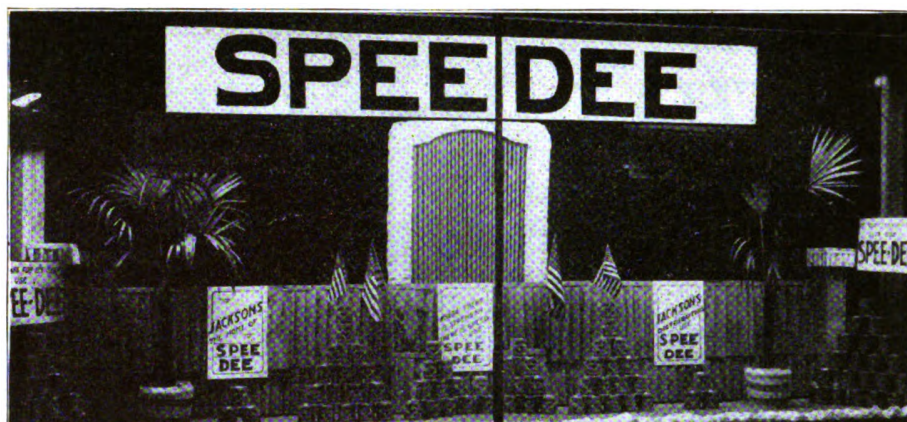
Inside Diameter

No. 2866 for Hose $\frac{1}{2}$ "	No. 2868 for Hose $\frac{5}{16}$ "
No. 2867 for Hose $\frac{3}{8}$ "	No. 2869 for Hose $\frac{1}{4}$ "

**ORDERS SHOULD ALWAYS SPECIFY
INSIDE HOSE DIAMETER**

WRITE FOR BULLETIN NUMBER EIGHT

A. SCHRADER'S SON, Inc.
BROOKLYN, NEW YORK
CHICAGO - - TORONTO - - LONDON



It Pays to Display SPEE-DEE

There is a big demand among the motoring public for something that will enable the car owner or driver to cleanse his hands after making repairs on the road. Water won't remove this kind of grime and gasoline means chapped or cracked hands. What then? The answer is "SPEE-DEE." About a teaspoonful is rubbed into the soiled hands and the grease and grime quickly disappear, leaving them soft and marvelously clean.

**Cleans
everything**



**Injures
nothing**

THE INITIAL SALE IS BUT ONE OF MANY

SPEE-DEE is the only compound that will effectually clean greasy hands without water and without injury to the skin. This feature makes it a ready seller to every man who owns or drives a car, and what is more important—a sure thing repeat seller. The man who buys a can once will find it so effective in cleaning his hands and useful for so many purposes that he will be back—again and again for more.

A window display, such as is shown above, will establish SPEE-DEE among the motorists of your locality. Those who don't buy as a result of the display will learn about it from their friends. Dealers and jobbers who have devoted their show windows to SPEE-DEE for a week or two are unanimous in declaring that it paid them handsomely.

The price of SPEE-DEE is moderate, yet the dealer profit is liberal. We furnish dealer helps and active co-operation in preparing attractive business-getting displays. Write us at once for particulars.



STATES CHEMICAL COMPANY
680 W. Austin Avenue Chicago, Ill.



American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 9.

CHICAGO

SEPTEMBER, 1921

"Service First" Wins!

"The thing that service stations and garagemen absolutely must realize," declared a recent visitor, "is that service and courtesy are elements that will be greater factors in their staying in business than ever before."

"These two go hand in hand, and upon them depend the amount of business which will be secured. People are now insisting that they be given real service and obtain cheerfully what they pay for. If full value is not given, they will go elsewhere."

To illustrate his point, our visitor cited a case which happened in a small community in southern Wisconsin. A friend of his, who had purchased one of the very high-priced cars only two years ago, was considering the purchase of another of the same make. In fact, he had already made up his mind to purchase the new car, despite the fact that a salesman for another make had been urging the advantages of his particular car.

The friend's car required some repairs and it was taken to the company's service station. It was looked over and a promise given that it would be ready at four o'clock the next day. At that time, the son of the owner called for it. He was told that it was not ready—in fact, it had not been touched. Upon asking the reason why, he was, in effect, informed that it was none of his business—that the car was only a "pile of junk." It might be done the next day and might not.

Naturally, the boy's father did not

relish having his high-priced 1919 car called a "pile of junk" by an employee of the agents of that particular car—and just at that time the salesman for

CO-OPERATION.

The whole trend of labor developments is toward closer co-operation between employers and employees. All the time we are learning to understand each other better and realize that we are dependent on each other—that there can be no prosperity for either of us unless the other shares in it. Underlying our prosperity there must always be co-operation and confidence.—Charles M. Schwab.

the other high-priced car happened in. He was told of the incident—and saw his opportunity.

"Bring that car to our service station tomorrow morning and you can have it tomorrow night," said he. And he did not urge the sale of his particular car.

The car was delivered to that service station the next morning and it was ready for the owner at night as promised. The good will thus created by the salesman, aided and abetted by the ill will engendered by the representatives of the other service station, resulted, within a few weeks, in the sale of a new car.

The purchaser is delighted with his new car—and tells all his friends about his experience with the service station that called his high-priced 1919 car a "pile of junk." He advertises it as a make of car to be avoided because of the lack of service and courtesy evident at its local service station.

It's service and courtesy that counts in the long run every time. The garageman or service station that builds up a reputation for service and courtesy will be in business and prospering long after others, whose motto is not "Service First," are forgotten.

Low Point Passed.

Week by week, the signs multiply that the country is definitely past the low point of depression. The report of the Federal Reserve Board, in Washington, issued the first of the month, gives this summary:

"Slight improvement in some branches of foreign trade, fairly good agricultural yields and enlargement of manufacturing demand seem to point to a more favorable autumn season, but the situation is not such as to forecast any extensive or immediate revival of business in a large sense."

The automobile industry is particularly mentioned in the report as having increased the number of men employed. Early this month one of the large manufacturers announced that 5,000 men would be added to their force this month, and others are gradually increasing their forces.

The trade reports received by the National Automobile Chamber of Commerce show a gradual improvement. The August automobile shipments gained 2 per cent over those made in July and reached 72 per cent of last year's August business. Normally August sales are less than July.

Conservative financial men express the opinion that there will be a marked improvement in business conditions

before the end of the year, and that from then on we will experience gradual improvement. In other words, that we have seen the worst, especially in a number of the basic industries, which have cut prices substantially so that they are near or at the pre-war level.

The first of this month a number of the automobile manufacturers announced reductions in prices which bring them down to near the pre-war level and in some cases below it. These are all signs that the automobile industry is rapidly attaining to a substantially stable basis.

Those manufacturers who have made radical reductions within the past year now have their prices at such a level that people are satisfied that there will be no further cuts, at least for some time, so sales will undoubtedly increase.

Only recently one of the farm journal publications conducted an investigation as to what might be expected from the farmers in the way of buying this fall. The answers to a questionnaire sent out to over 12,000 of the publication's subscribers who were selected as typical Americans were indicative that the farmer will buy this fall.

Altogether it is estimated that the total purchases of 1,100,000 country families will aggregate over \$900,000,000 this fall. Of this amount, over \$160,000,000 will be invested in automobiles, motor trucks, tractors and gas engines.

This is most encouraging information, for with the farmer again in the market the wheels of industry will turn steadily and continuously. Probably for the first time in our history, we are actually realizing that the farmer is really in back of our prosperity.

We have learned many lessons in the past few years and had many experiences, some pleasant and profitable and others not so pleasant. The automotive industry was one of the first to undergo readjustment and is

one of the first to recover. And from now on the recovery will be more rapid.

Road Building Prospects Good.

The foundations for a sound federal road-building program are now very well advanced. The Senate, before

GET THE SAVING HABIT.

There is nothing more important than to save part of your income and invest it safely. This provides against life's two greatest misfortunes—sickness and old age. Therefore, get the saving habit. It will also help you to buy the most valuable possession in the world—your own home.—Robt. H. Ingersoll.

its adjournment late last month, passed the federal highway bill which contained most of the provisions that have been agreed upon and passed by the House.

The bill now goes to a conference committee and if it is accepted as it stands, the way will be clear for a nation-wide drive in highway construction, particularly in those states which have held up contracts and plans awaiting a definite decision of policy by Congress.

In addition to providing for expenditures and appropriations for roads, there are drastic maintenance provisions incorporated and more rigid requirements governing types and surfaces of highways.

With the enactment of this bill into law, undoubtedly much work will be done on highways this fall and many will benefit from it. A system of good roads, well kept up, will be of inestimable advantage to both city and rural districts. And naturally the automobile dealer will benefit, for good roads encourage automobile sales.

One of the developments of the past two or three years, which has spread rapidly in Western cities, is the municipal camp ground. West of the Mississippi river almost every city and town has a free camping ground, and in the summer season it is surprising the number of automobile tourists

who take advantage of these communities' hospitality.

The stay of the tourists varies from one night to weeks and, in some cities, steps have been taken to limit the length of time parties may remain in order to make room for other tourists. Of course, the communities profit from the stay of the tourists, for supplies of many kinds are purchased, including those for the automobile.

Good roads encourage people to take vacations by motor cars. And the more people that do this and have a satisfactory experience, the more motor cars, accessories and camping equipment that will be sold. Automotive dealers generally will welcome the new federal highway legislation which now seems to near fruition.

Use Genuine Parts.

"Pirate parts" have been a bugbear of manufacturers for some time, not only in the automotive but in other industries as well.

The mechanism of the automobile lends itself well to the substitution of parts which are inferior to the parts originally put in by the manufacturer. Of course, the ones who profit by the substitution of inferior parts are those who make them and the dealer who obtains them at a lower price than genuine parts.

The car owner usually has to pay full price in addition to paying for the time spent in putting them in, and then he pays again for their replacement when they cause trouble.

Naturally, the car manufacturer is desirous of having only parts that he knows are good used for replacements, for inferior parts will not stand up—and the car earns a bad reputation.

That is why manufacturers urge car owners to insist that genuine parts only be used for replacements on their machines, for both the manufacturers and the car owners benefit by it.

Garagemen by using "pirate" parts build up a reputation for unreliability and poor work—and this reputation, of course, always results in loss of patronage.

"Outdoor Repairshop" Is Popular

Large Lot at Rear of This Man's Garage Afforded Space for Outdoor Repairshop Offering the Advantages of Work in Open Air and Good Light All Day During Spring, Summer and Fall Months—Handles Many Lines Successfully

By K. H. Lansing

As an example of the number of inter-related activities in which a garageman in a small town may be successfully engaged, take the case of Isaac Lippincott, proprietor of the Moorestown Motor Co., Moorestown, N. J., a town of 6,000 inhabitants.

Lippincott is agent for both Dodge and Buick cars, his territory covering one-third of Burlington county. Ordinarily, he has only one salesman on the road with a car, to assist him—yet his sales are gratifying.

Lippincott and his aid count much upon their extensive acquaintance to help them in making sales, as is the case with most small town agencies. In the usual way in such places, they obtain not a few prospects "by guess and gossip"—that is, by hearing John Smith say that Tom Johnson was talking about buying a car.

But many names of prospects are brought to them by customers whose good-will they have obtained in various businesslike ways. They also send out a small quantity of "follow-up" mail—appealing letters containing factory advertisements, fitting the envelope. Occasionally, they take a chance of gaining nothing but further acquaintance—which always helps—by driving out and making a few random demonstrations.

There are many "stop-in" customers at the Moorestown Motor company's attractive garage. It occupies a conspicuous location on the asphalted main street, its gasolene pumps and free-air tube beckoning the motorist like silent salesmen.

Constructed of light buff brick with ornamental trimmings, the building has a frontage of 50 feet and a depth

in excess of 100 feet, not counting the small, separate brick building in the rear, which serves the double purpose of a heating plant for the garage and a completely equipped blacksmith shop with a large forge.

A feature, not altogether uncommon

Activities of Moorestown Motor Co., in a Town of 6,000 Population:

Agency for Dodge and Buick cars.

Sells Michelin, Goodyear, Goodrich and Hartford tires.

Repairs an average of 30 cars a week.

Repairs tubes.

Recharges and repairs batteries.

Has garage storage capacity for about 50 cars and garage is well filled every night.

Takes pride in its finely equipped repairshop and charges a good rate, but is relieved of "pottering" jobs by letting customers, who are so inclined, make minor adjustments and wash their own cars.

in New Jersey garages but the only one of the kind in Moorestown, is a large "outdoor repairshop," used in spring, summer and autumn, the cars being arranged in a semi-circle in the large lot at the rear.

This is no inconsiderable factor in keeping the mechanics contented and healthy. The three or four whom Lippincott employs all expressed their liking for this airy working place with

good light up to the last minute of sun.

The remarkably well-equipped machine shop opens upon this outdoor workshop, the driveway to this department leading from front to rear down a considerable incline, without the necessity for a ramp. This also does away with an elevator, the arrangement being such that, from the front, the salesroom, office and garage are on a level with the street entrance.

Among the larger machines in the repairshop are a high-speed drill press, a lathe and an emery grinding machine. The large machines, like the individual work-benches, each outfitted with a full supply of small tools and a vise, are placed beneath the large windows.

The shop being virtually the same size as the garage, because of its peculiar construction, makes it an especially desirable one in which to work. There is no crowding and there is plenty of air and light. When necessary, a dozen cars can be easily stored here for the night as an "overflow" from the garage proper.

In the garage, in the rear of the salesroom and office no less than 35 automobiles are accommodated with ease. Trucks are not refused storage and service, but no effort is being made to obtain this business.

One of the ways of obtaining the good-will of customers who have purchased cars, is to allow them to wash and make minor adjustments and do other light work with their own tools on their cars either while in the garage, in which there is ample room to do this, or in the outdoor workshop in the rear.

A good rate is charged for mechanics' repairs



Outdoor Repairshop in Rear of Garage—An Inclined Driveway Through Building Leads to Street.

on cars, and customers must bring their own tools when they make their own adjustments. The repair end of the business is especially strong, so that Lippincott can afford to extend his courtesy to his customers, thus being relieved of the little "pottering" jobs which the customer can just as well do for himself.

An average of 20 to 30 cars a week, on which charges are made, is maintained at this repairshop.

In the front of the building, on the right as one enters, is the battery department, where batteries are recharged and generally repaired. The system permits the recharging of 16 batteries simultaneously. This department, with a battery expert in charge, always does a brisk business. There are bins for parts on this floor, an extensive stock on hand, which is never allowed to run dangerously low in any item, being kept.

The company is agent for the following brands of tires, which it has found better to handle in fair-sized quantities: Michelin, Goodyear, Good-

rich and Hartford. Tubes, but no casings, are repaired here.

The company carries a medium-sized stock of general automotive equipment, but makes no display of it, the bulk of it being stored in bins.



Conspicuously Located on the Main Street of Moorestown, N. J.

Up to the present time, Lippincott has not found it necessary, or especially desirable from his viewpoint, to originate forms for either the office or the repairshop. He is using stock forms; such as a salesman's daily report, garage storage form, time card and repair job card.

Lippincott early realized that, with

a great many lines of activity and a small force, it would be decidedly necessary to exert particular care in the selection of his assistants. So, he has gradually built up a force of experts in their various departments that

are second to none, not only in Moorestown but in all of Burlington county.

The test of efficiency of the operator is shown by:

(a) The amount of business done in a given time.

(b) The increase of the business.

(c) By quick turnovers.

(d) By economy in operating expense.

(e) By the short time lost in repairing.

The men are the best that can be obtained in that locality—at least comparisons

show there are none better there—and they are paid the top wage. The customer is satisfied; so is the help; and so, very apparently, is Lippincott.

By giving attention to the comfort and convenience of his customers, Lippincott has built up a flourishing business for which, it is evident, the motto "Service First" is a basis.

Meeting the Backyard Competition

Mushroom Repair Shops Can Absorb a Large Aggregate Volume of Small Town Business—But the Regularly Established Garage Has a Good Defense Against Them in a Well-Selected Line of Accessories and Specialized Service

By C. M. Adams

Since its beginning, the automotive industry has been marked by a healthy, altogether helpful competition, and in no branch of the industry has this been more conspicuous than in the repair garage and service station field.

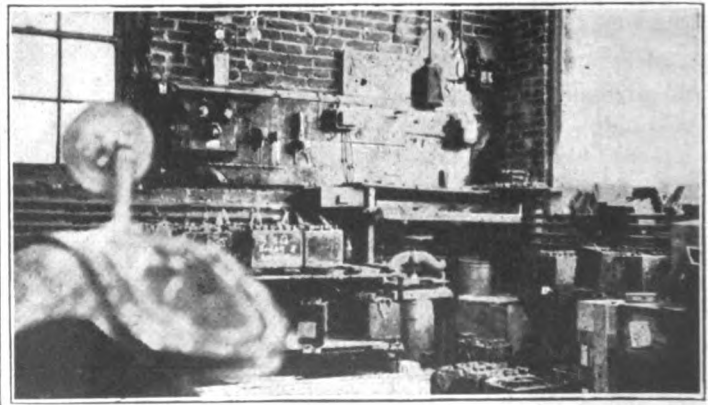
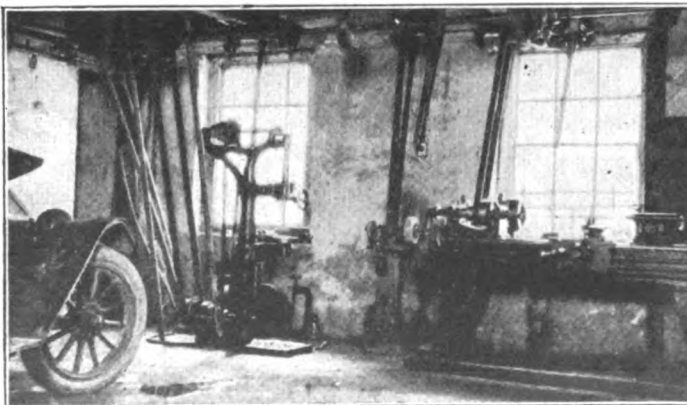
Few cities and towns over the country have had this class of business

monopolized by a single individual or organization, and these not for long, with the result that service, from the patron's viewpoint, has been improved, and business, from the proprietor's viewpoint, has been stimulated.

But, during recent years, men operating repair garages and service sta-

tions in small towns have been confronted with a new sort of competition not so healthy or helpful—the competition of the backyard shop.

These shops are quite familiar. If a mechanic becomes dissatisfied, has a disagreement with his employer, or finds himself out of a job, he simply



Lathe, High-Speed Drill Press and Emery Grinder Add to Efficiency in Moorestown Garage.—16 Batteries Can Be Repaired Simultaneously.

rents an empty barn or side-street storeroom, moves in his kit of tools, and hangs out a sign reading, "Garage. Repair service promptly done at reasonable prices."

Apparently, competition of this sort should be a joke, and anyone not familiar with it or the small town would class it as negligible at most. But it is neither. At best it is disagreeable, and at its worst it constitutes one of the most serious forms of competition regularly established garages have to meet. This for two perfectly sound reasons—because of the number of these shops, and because they can undersell the larger establishments.

To show just how numerous these shops may become, let me cite the example of a small town in southwestern Ohio with the conditions of which I am familiar. This town is one of some 2,000 inhabitants, and it is served by three well-equipped and alertly managed garages. Yet, during the last two or three years, there have been at all times five and sometimes as many as seven of these backyard shops, all doing work far more cheaply than the larger establishments.

One routine repair job, for example, which had previously been done by one of the three larger shops for \$20 was done by one of the smaller shops for \$6, because conditions made this sort of thing possible.

The small shops had no overhead to speak of—small rent, insignificant investments, no fixed payrolls, no accounting or maintenance charges—and the result has been that what these five or six or seven backyard establishments have been able to whittle off the

and people have a desire to change, to try new things and new service.

But this competition can be met, just as can any other sort of competition, and one of the chief means at the disposal of the regularly established garageman, whose business is threatened, is better service.

These backyard garages are almost invariably small one-man, one-job, one-car shops. So the car owner who finds another car already on the floor, who wants his work done in a hurry, or whose work will require special service like towing, battery charging or detailed machining, will have to go elsewhere. This is the opportunity for the proprietor of the regularly established garage who has greater space, more men, and more facilities for giving specialized service.

Let him remember this and tell people about it, feature it in his advertising, in his sales talk, and in any of the various means used to swing business in his direction, for service is the biggest thing a service station has to sell. If it is better than that a competitor can give, customers should be told about it, particularly when this service is, in addition, responsible service.

Men who undertake backyard ventures are generally without considerable financial backing, for, if they had considerable backing, they would conceivably set up larger establishments.

Lack of backing, of course, does not imply a lack of the ability to do good work, but the fact that the proprietor

of a repair garage is financially responsible does have a great deal to do with the confidence a car owner places in the service of this garage.

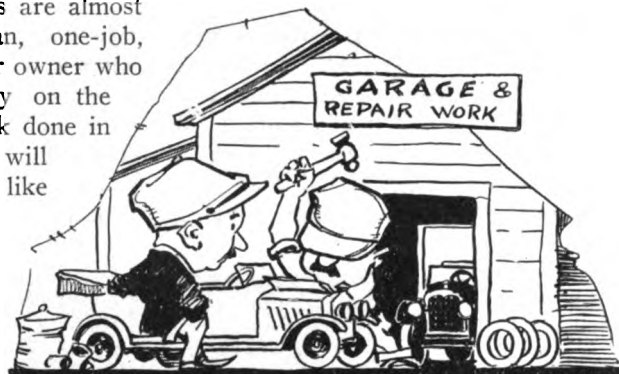
For example, if a car unprotected by insurance is seriously damaged in a collision during a limbering-up run following repairs, the owner would like to look to the garageman for full and fair satisfaction

without recourse to litigation which, in the case of the usual backyard garage, might establish only the fact that the proprietor could not pay.

So, the proprietor of the regularly established garage should feature this,

too—not offensively, not in a way to cast unwarranted reflections on competitors which would have only the effect of injuring his own business, but honestly and in a way to build up confidence in present and prospective customers.

Confidence is, after all, the heart of



The Backyard Establishment May Be Cheaper—But What About the Brand of Service Rendered?

the relation between the car owner and the service man. Unless the service man can inspire confidence, unless he can take over a car with the complete trust of its own, he has failed.

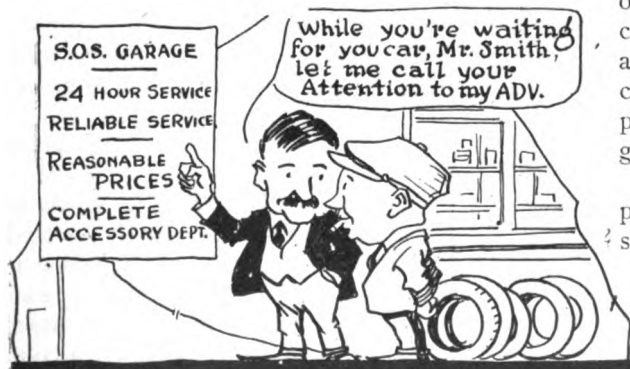
Accessories are the remaining means by which the regularly established garage can meet backyard competition. They have been prescribed as the panacea for every sort of garage ill. But they do represent a means, and a powerful means, of keeping customers from going to the smaller competitors because they do so through the natural flow of business.

If an owner has been coming to a regularly established garage for the thousand and one incidental supplies his car needs, he is likely to come back when he needs service. Rather, if he does not, it is because the garageman has failed to take advantage of the opportunities for selling him service, because, in most small towns, owners must come to the established garages for accessories.

The backyard shops with small space, small personnel, and small capital, cannot afford to handle them. The result is that another and powerful defense is offered the proprietor of the larger establishment. So this is how the garageman can meet backyard competition.

Of course, it is not intended to infer that every backyard repairshop is an undesirable addition to the automotive industry. In many cases these shops house mechanics who can give splendid service—mechanics who are

(Concluded on page 15)



A Good Stock of Accessories is an Unfailing Aid.

total available business has proved to be a considerable slice of the aggregate.

Each mechanic running one of these shops has his friends. Price is always a lure to a certain class of patrons,

Let Your Windows Aid Your Sales

Automotive Accessory Dealers May Boost Sales Materially Through an Unusually Attractive Arrangement of Display Windows—Some Ideas Which Others Have Successfully Used Featuring Particularly Outing Equipment

By Ernest A. Dench

During the motoring season, everything on wheels that can be made to go is on the road. This means that every car owner is in the market for accessories to ensure the comfort of his joy rides. Like the woman who blossoms forth with a new outfit on a Sunday morning and tragically finds that she has forgotten to buy hose to match the shoes, the motorist may find himself stranded miles from civilization because of the neglect to provide some needed accessory.

The country setting, in which the articles necessary for the successful motor picnic or beach trip are introduced, will go a long way in reminding the car owner of the things he should take along. You help him, he helps you and the advantage is mutual.

All Set for the Picnic.

Gimbel Brothers, Philadelphia, Pa., made effective use of American flags as a window background. The striped ends of two flags were gathered into a knot at the top of the wall, but the lower parts of the flags were arranged to form an open fan.

The left rear was occupied by a clothes tree, on which was hung a brown mohair dust coat and a black cloth motoring cap. To the right of the clothes tree was a rustic chair, with a linen motoring coat laid over the arm and seat of the chair. A motor horn was laid over part of the coat, while hung on the chair back was a linen automobile cap.

An automobile windshield reclined on the floor against the chair. At the center came a rustic table, draped with an automobile robe. On top of the

robe was a large brown leather picnic hamper, which was opened and tilted forward in order to reveal the complete outfit of cutlery and dishes to ensure the successful picnic.

To the right of the table a rustic rocking-chair was placed with a mo-

hibit in this roomy display was a real motor car, the owner of which had evidently parked his car for the night in some quiet rural retreat and got the best of the local hotel owner by opening up the bed and attaching it to his car. This motorist—represented

by the figure of a man—was shown peacefully sleeping in his improvised bed.

At one side was another bed compressed into limited space for carrying along on a motor tour. Another use for the bed was shown at the opposite side, where it performed noble duty as a table, laid with a tablecloth and occupied by all the food and accessories needed for a picnic lunch.

The H. O. Harrison Co., San

Francisco, Cal., transported spectators to the open country by means of a very realistic window setting. The painted drop that covered the back showed a babbling brook in the middle of a wood. The illusion was further carried out by planting real trees, shrubbery and undergrowth in different parts of the trim.

A motor car had come to a halt in the center, and judging by the erected tent and the made-up beds, it was evident that the automobile party had planned to stay in this retreat overnight. They also meant to have a good time, judging by the guns and fishing tackle that reposed on the ground outside the tent. In the foreground was an imitation fire, frying over which were two artificial trout. Around the fire was a grub box, coffee-pot, bake oven, and various cooking utensils.

Crossing the Desert.

Price & Co., Roswell, N. M., had



Invitingly Beautiful, Eye-Arresting, and Distinctive Is This Show Window Display. Such Windows as These Attract and Hold the Interest of Passersby.

tor tire and an inner tube coiled around a corner of the chair back. Hanging on the opposite corner of the chair back was a pongee dust coat. The part of the coat that was draped over the chair seat contained a flashlight and a motor horn. A square brown leather cushion was propped up against the chair back from the seat to the top of the chair arms.

A single row of articles on the floor along the front of the trim comprised a thermos bottle, automobile tin pump, automobile clock, portable steering-wheel, folding extra seat, spare tire and motor mirror. Straw, dyed a green color, served to represent the grassy floor.

Sleeping in the Car.

The Cut-Rate Auto Accessory Store, Toronto, Can., had a window sales drive on a portable and collapsible bed recommended as a boon and a blessing to motor tourists. The central ex-

a window display which represented several motoring parties traversing scrub land, such as is encountered in Texas and other southern and western states.

The floor, which was one mass of sand, was cut through to make a winding road, along which were several motor cars. Two small terrapins sunned themselves on the desert sand, near the roadway, while a large snake was coiled near a sotol weed. The desert was dotted with cactus plants, while a rabbit was making its hasty exit over a small hill planted with scrubby pine.

A Woodsy Setting.

Macy's, New York, filled in the background of an automobile accessory display with four painted panels, depicting swans gliding along a peaceful stream in the middle of a woodsy dell. A moss-covered rockery was planted across the rear of the window floor, with motor traveling trunks on low white enamel benches in between.

A white enamel garden table placed at the center right was occupied by an automobile luncheon outfit, together with a pair of goggles and a motoring cap. At the opposite side was a white enamel chair, with a motor coat and a thermos bottle laid on the chair. Strewn over the strip of artificial grass in the middle was a motor cushion, automobile clock and a camera.

Good Roads vs. Bad Roads.

A display arranged on behalf of the Washington Association of State Good Roads at its Seattle headquarters could be adapted to push the sale of automotive accessories. The cardboard background, which was cleverly executed in colors, was of a pretty valley, dotted with innumerable farms. A road that ran through the valley was extended into the window itself by means of cardboard strips.

Farm lands on the floor were laid out with sand and fenced with matches and toothpicks, placed upright. Toy cows, sheep and horses grazed on the farm lands. Several toy motor cars were placed at different points along the road. An excellent contrast to this good roads movement was provided at the right of the trim, where a bad road of rock and sand was constructed. The wrecked machine at the side of the road told its own story.

The Beach Appeal.

The Cycle Co., Philadelphia, Pa., depicted the ocean on a painted can-

vas background. This served to visualize the sign in the window near the front:

"To Atlantic City—in 90 Minutes
Fare 32 Cents on a Motor-cycle."

Taking up the whole of the center of the trim was a young man wearing a khaki outing suit and cap. He had just adjusted his machine in a stationary position and was posed in the act of adjusting his fishing-rod reel for action.

A crab net was on the floor beside the motor cyclist. The floor was covered entirely with sand. Another bit of beach "atmosphere" was provided down in front by a mound made of sand to represent a fort, with a flag inserted at the top of the fort. Around the base of the mound were buckets, shovels, sea shells and other beach accessories to please the kiddies.

Avoiding Car Troubles.

J. J. Snyder & Son, Brooklyn, N. Y., displayed theft signals, fire extinguishers, cementless patches, spark-plugs and lamps on the floor over individual lace paper mats. Backing up the display was the following card:

"Keep your car in order and avoid trouble on the road. Here are a few suggestions."

Taking the Right Precautions.

Sowles Hardware Co., Plattsburg, N. Y., enclosed the rear of its show window with wallboard panels. The middle panel showed a motorist repairing his car on a lonely country road miles from anywhere. The two side panels bore the announcements:

"Motoring brings few mishaps that the right tool will not cure."

"We have just the accessories you want to add to the comforts and pleasure of motoring."

Painted across the entire three panels was a headline that ran:

"Automobile tools and accessories of all kinds."

In the window were a number of fire extinguishers and batteries, each displayed on a white cheesecloth-covered mound.

A Drive On Motor Maps and Books.

The Foster-Brown Co., Ltd., Montreal, Can., had a drive on motor books and maps. At the rear was a cardboard cut-out in colors of a motor car speeding through a country village. Across the top of the cut-out was inscribed this announcement:

"Books on the care and repair of the automobile.

Automobile Blue Book—(1) New York and Canada; (2) New England and Canada—\$3.25."
Guide to Quebec—\$2.50.

The display contained an extensive range of books and maps of value to the motorist.

Pushing Motor Goggles.

Liggett's, New York City, featured motor goggles in a window display. Two wallboard panels enclosed the rear, with pair of goggles attached to the wallboard over round, lace paper mats.

The first panel was draped with green tinfoil paper, with yellow smoke-glasses laid over the tinfoil in places not covered by the mats. The same arrangement was repeated on the second panel, except that rose-colored tinfoil paper was employed. On mounds down in front, motor goggles were displayed over a blue cloth covering.

MEETING THE BACKYARD COMPETITION.

(Concluded from page 12.)

simply taking this humble start toward a bigger and brighter business future. For these the industry should have nothing but encouragement.

Neither is it intended that, because a man has had merely the good fortune to be the first on the field and has had time to establish a prosperous business, he is therefore automatically and divinely protected from meeting any reasonable competition.

But in far too many cases these backyard garages are simply haphazard enterprises, conducted by men who, through not being able to fit into an organization or a desire to take a fling at the game on their own, try this only temporarily. As such, they are not entitled to the support and co-operation of business men in the community who are going ahead on a permanent basis.

The situation in many localities is one which is decidedly trying to the proprietors of established garages—sometimes depressing to those who have put their time and money into developing a business that is being eaten away by the combined efforts of nibbling competitors.

But there is a defense in better service, responsible service, and more accessories, and the man who puts effort and emphasis on these need have nothing to fear from the encroachments of all the backyard shops his town can array against him.

Accounting:

Our September Article Discusses the Customer's, Sales, or Accounts Receivable Ledger and the Two Kinds of Duplicate Statement Ledgers—Use of Duplicate Statement Forms Offers Convenient as well as Economical Method of Recording Transactions — Quiz Questions

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automotive Accounting

In a discussion of sales ledgers and ledger posting, we will consider only the loose-leaf types. These are of two general kinds—the regular straight ledger and the duplicate statement ledger.

The straight ledger-leaf forms can be classified into two other groups: namely, the itemized forms and the non-itemized forms. The use of numbered sales tickets or invoices has, however, become so general in business that the use of itemized ledger accounts is a rarity.

In these times, when we want information we want it in a hurry and we have no time for duplication of work—especially in our bookkeeping. The old-fashioned method was to write all the details of a transaction in a daybook or blotter, from the blotter make up an invoice, from the blotter post in detail to the ledger account; and then, at periodical intervals, transcribe the ledger account in detail to a statement. This was mis-called "bookkeeping."

In a later method, a sales slip or invoice, in duplicate or triplicate, was

The image shows two identical blank forms for 'LYNDALE SERVICE GARAGE'. Each form has a header section with the business name and address, followed by a grid for recording transactions. The grid has columns for 'DATE', 'ITEM', 'DEBIT', 'CREDIT', and 'BALANCE'. The forms are perforated between them, indicating they are designed to be torn out as individual statements.

A Practical Statement Form—Two Blanks Like This Are Printed on One Page With Perforations Between Each.

made out and postings to the customers' ledger were made from the copy of the sales ticket, with a number for reference. When the postings were completed, these tickets were filed numerically for reference. If two copies were made, one could be filed numerically and the other alphabetically. The third copy was always available should the customer lose the original sales ticket.

It is readily seen that, if all details of a sale are shown on the original slip or invoice, there is no necessity to

show more than a reference number in a ledger. As, in the first case, statements are a transcript of the ledger account only, in this case as the ledger account is not itemized, neither is the statement.

Many bookkeepers using this method do not wait until the end of the month to make up statements, but post them daily the same as they post the ledger accounts and check the statements against the ledger accounts to prove the correctness of the posting.

This method has many good features to recommend it. The straight loose-leaf ledger is gradually being replaced by the faster and more efficient duplicate statement ledger system. This consists in posting direct from the sales slip to a customer's statement and, by a carbon sheet, making a duplicate of the posting for a permanent ledger record, reducing bookkeeping labor $33\frac{1}{3}$ per cent to 50 per cent and providing a more accurate record with reasonable safeguards.

Remember, every time you transcribe or copy figures, there is a chance for error. The fewer the copies, the fewer are the chances for error.

With the exception of the heading, statement forms are little different from ledger-leaf forms. They consist of horizontal forms for itemized statements and perpendicular forms for non-itemized statements. There is usually sufficient room on the per-

The image shows a 'Special Petty Account Ledger Leaf'. It is a long, narrow form with multiple columns for recording transactions. The columns are labeled 'NAME', 'ADDRESS', 'DATE', 'ITEM', 'DEBIT', 'CREDIT', and 'BALANCE'. The form is designed to be used for recording petty accounts for several years, with perforations indicating where it can be torn out.

Special Petty Account Ledger Leaf Will Accommodate Petty Accounts for Several Years.

pendicular forms to itemize if desirable. For ledger-leaf and statement forms, the balanced ruling is strongly advocated. For that reason, only forms with balanced ruling are shown in this article.

In the duplicate-statement ledger, the duplicates are sometimes ruled. However, they are generally plain. In the combination duplicate-statement ledger, a permanent ledger leaf forms the set for each account. On this ledger sheet are posted monthly totals from the statement duplicates, furnishing in monthly totals a record of transactions covering a period of several years on an active account.

There are many wrong ways of operating a duplicate-statement ledger, but if you will try to remember one of the safest rules in bookkeeping—one account only to a leaf—you can avoid one of the commonest and most serious mistakes.

Most garagemen have some inactive, transient or petty charge accounts. Now, few of these are ever rendered statements and many of them appear but once in our books.

To take care of this class of accounts, we have a special petty account ledger leaf ruled. This leaf immediately follows the index sheet, and one for each index subdivision will accommodate all the petty accounts one would have in several years.

The most economical size for duplicate-statement leaves and, in fact, all ledger leaves is 11 inches by 14 inches. Do not forget, however, that, unless your loose-leaf binder is very small,

On the Permanent Ledger Leaf Are Posted Monthly Totals From Statement Duplicates.

duplicate statements can be furnished to fit it.

The forms illustrated are those which the writer considers the most efficient and, for that reason, the single capacity itemized ledger leaf and the horizontal itemized duplicate statement are not shown. You may find these other forms illustrated in articles published in the 1920 issues of the AMERICAN GARAGE & AUTO DEALER.

One outstanding feature of the perpendicular statement forms is their economy—the usual order is 1,000 sets, 800 with four on and 200 with two on, making in all 3,600 statements to 1,000 sets. This combination brings the price of statements below the price of the statements regularly used. In addition, a ledger record is provided and labor reduced 50 per cent.

To all readers who would like to in-

stall the duplicate statement system, the accounting department of the AMERICAN GARAGE & AUTO DEALER will be pleased to furnish complete instructions. We can also advise with you as to indexing and methods of posting and proving up ledgers. We would like to hear from our readers on accounting matters. Give us some questions to answer.

The "Garage Accountant," a little house organ published to reach the garage bookkeeper will be sent postpaid to any readers of the AMERICAN GARAGE & AUTO DEALER who desire it.

In the August issue, an error crept in which might lead our readers to think that pay-roll distribution and expense distribution were on one form. Expense distribution is not the reverse side of the pay-roll distribution but a distinct form. This article, read in conjunction with the similar article last year, should cover fairly well all the details of sales ledgers.

(To be continued.)

Quiz Questions on Garage Accounting.

Name two types of sales ledgers.

Discuss the duplicate statement ledgers.

What are the advantages of this system over the old system?

What are the two types of statement forms?

In what way do statement forms differ from ledger-leaf forms?

Discuss method of ruling for ledger-leaf and statement forms.

What saving is effected through use of the combination forms?

What is the purpose of the permanent ledger-leaf?

What provision may be made for petty charge accounts?

This Form Is Printed Four on a Sheet With Perforations Between Each Form for Ready Detachment When Needed.

Missis Hecker Gives Us a Party

Weed All Bin Crabbing in the Garaje but That Party Fixt Everything Up and Started Us Plugging for the Boss, the Bizness and the Bosses Wife—The Boss Has a New Skeem, Pete; Did You Ever Hear of a Libry in a Garaje?

By Frank Farrington

Deer Pete:

Hows bizness in Pinkvill ennyway? Is your boss one of theez fellers that goes around croking whenever they hav a poor week, and not trying to do ennything becaws bizness is bad? Or is he like my boss that never trys enny alibi stuf and when there aint much doing just gets bizzy and trys to start sumthing to get sum bizness?

Thats one thing Ile say getting mar-rid to Dazie—I meen Missis Hecker—has dun for our boss. He used to be a regguler gloomy gus when weed hav a bad week and heed go round saying bizness was rotten and it was hard times and dam the admin-istrashon and all such mush. And now he thinks every day is a good day.

If bizness aint good today, he says its pretty good considering the wether, or if there aint much bizness he says its giving us a good chanse to get cawt up with a lot of work and givs him a chanse to get up sum new adver-tising dope.

If thats what getting marrid does for a bizness man, theyd all awt to get marrid and forget where they got that ideea that everybody has stoppt living and erning munny and spend-ing it. Everybody I kno is living more or less and erning munny, and you needent tell me fokes thats erning munny cant be got to spend it. I notis nobody has to urj me much to spend my munny. Ime that way most of the time. I spoze its all how you look at it. Pa alwys says munnys made round so it'll roll and ma says its made flat so it'll pile up.

Weer all pretty strong for Missis Hecker lately. She was all rite be-fore she got the halter around the

bosses neck, but I gess sheez more poppilar now. Mebby its becaws she giv us a party the other nite.

She cum down to the garaje and she told us she wanted us all to cum up to their hous in the evening and we went—Persy and Chick and all, and a new feller weev got, calld Polo. I dont kno his reel name but he aint a polock ennyway. Heez a feller the

and then sum. There was one littel flapper there that I pickt out in a min-nit. Her name was Sally Rader and she got mad becaws I calld her Sally-ratus, but she diddent stay mad. Ime that way, Pete. The girls dont stay mad at me.

But I was going to tell you about a speech the Missis made. After we had dun et our eets we sed "Speech, speech." So she got up and she sed this:

"Boys, that wed-ding present you giv me was a pœch-ereeno. We think more of that than ennything els we got. We thank you for it. And wile Ime thanking I want to thank you for the good work youre do-ing down there to the garaje. Mebby you dont figger youre working for me, but I do becaws, buleev me, Ime go-ing to be the one that spends most of the munny that ga-raje makes."

I awt to put in lafter there, Pete, like they do in speeches. Then she sed: "I think its all rong that a lot of bizness mens wives dont care a darn about the fellers that work in their husbands bizness and help him make the munny. I bin on your end of the deel and I kno when weer working for sumboddy and making munny for em, we like to hav em sho they kno weer alive.

"Well Ime your frend and I want to see you all good frends of me and of one another and if your boss dont treet you rite enny time, you tell me. This issent the only time Ime going to invite you eether."

Well we all danst and I and Sally-ratus got on together fine. Sheez sum danser, Pete, Ile tell the world and lissen! Sheez going to be the bosses new stenografer! It looks now, Pete,



"It Looks Now, Pete, Like Ide be the Next One to be Getting Married. Say, You Awt to See That Sallyratus Girl!"

boss got that was in the war and was a kernel or sumthing. He aint enny kernel in our garaje Pete. Heez just a washer and sumtimes drives for funerals.

What I was going to say was that that party was a good thing. For about a week weed all bin crabbing in the garaje about everything. Chick started it and Persy alwys helps enny-thing along that awt to be stoppt and this kernel Polo fell rite in and they kept the rest of us all mixt up.

But that party fixt everything. We begun to feel better before we got to the bosses hous becaws we all went in a bunch after we got the greese out of our errs, and Polo he made a sqwad of us and off we marcht.

The eets was ok and then there was sum janes cum in that was frends of the bosses wife and they was ok too

like Ide be the next one to be getting married.

Well that party got us all feeling rite and plugging for the boss and the bizness and the bosses wife and if we dont make more munny for her to spend it will be funny.

The boss has fixt up a new skeem for us, Pete. Its a libry. What dyou think of that, a libry in a garaje! Well it wood be a pretty good thing if your boss wood fix up one for you. Ile tell you whats in this libry. Its a shelf in the offis and theres books about gas enjins and about mekannics and about loobrickashons and about masheenery and about sailsmunship and about advertising and about demmunstrating.

Theres automobile maggazeens and papers about garaje managing and selling automobiles and acksessories. And there copies of instruckshon books and little leafs that tells all about different cars and different carburetters and all kinds of things.

So if a feller can reed, he can find out jest about ennything he needs to kno, and the boss says if heez wize he aint going to wait til he wants to kno a thing to find it out but heel lern it in advanse. Sum of us is studdying theez libry books and sum of us issent. That there Polo, heez a pretty fresh guy, but he eets up libry books rite along. When he goes to lunch I see him sitting there with a book proptt up in frunt of him eeting and reeding at the same time.

And theres Chick and you coodent get him to look in a book on a bet. "I kno how to do my work," he says. "so what I want to reed about it in a book for?" I sed mebbly heed find a better way to do it and he sed he gesst his way was good enuf.

I told him he was one of theez guys that thawt the way ennything had alwys bin dun was good enuf way to keep rite on doing it and it was a wunder he wassent a hostler insted of a garaje mekannic if the old way was good enuf for him. He diddent hav much to say about that but I notis heez alwys reddy to do ennything enny new way thats enny easier.

Say, Pete, you awt to see that Sally-ratus girl. Sum chicking. Sheez cumming to work tomorro. Ile bet sheez glad she met me so sheel hav a good frend in our place when she cums.

Yours til the cows cum home.

BILL.

PENLINGS FROM THE PEN OF DIKE.

Selling satisfactory service in September means more customers in December.

Every motorist should be treated as if he were the only customer you had that day.

Politeness is as essential in business as it is in courtship.

Telling the customer facts about an article makes him come back and besides he tells others.

Each day try to make your garage more att active to the motorist, and business will grow.

Many a garageman has gone broke from worrying about what his competitor is doing.

Be prompt in answering your correspondence, for promptness is a great credit asset in the business world.

Every member of your organization should know all about the motor car you sell Mr. Auto Dealer, whether he is a salesman, mechanic, bookkeeper, porter or whatever his position may be. The prospective buyer may ask any of them.

Right advertising, right methods of doing business, and treating the customers right, will keep your bank account on the right side of the ledger.

September is the month of county fairs. A nice display at the fair will net you nice returns.

If you are a mechanic, have confidence in your ability to do things right. Be like the mechanic who owned a welding shop in Arkansas. Outside of his shop was this sign: "I can weld anything except broken hearts and broken promises."

Believe in your town. Believe in your state. If you cannot believe in them 100 per cent, why move away. The town doesn't need you and the state is better off without you.

When a customer begins to quote mail order prices to you, just mark it down that it won't do to credit that fellow. He owes some merchant is the reason that he had to send away.

When a banker hollers "hard times," he has two reasons. One is that he wants to raise the interest rate—the other is that he wants to cut down loans.

Schools start in September. Why not start a small school of your own, Mr. Dealer, among your employes and discuss such subjects as service, smiles, happiness, cheerfulness, cleanliness, and "boostness"?

The world hates a knocker and a coward, but they are no worse than a pessimist and a kicker.

I once knew a fellow that said advertising did not pay. When he said it he was in business. He is not in business today and he is not dead either.

Get out in the bright September sun and let the world know that you are a live one. Advertise, smile and be happy.

House New York Show.

Grand Central Palace will again be the scene of the annual national automobile show in New York City, January 7-14, 1922.

Decision was made earlier in the year to exhibit at Madison Square Garden if the Palace could not be secured. It was believed that the exhibition hall, which has housed the New York automobile shows in recent

years, would be converted into office suites; and an option was accordingly taken on the Garden with the understanding that the larger quarters of the Palace would be utilized if available.

The national automobile show at Chicago will be held in the Coliseum and the 1st Regiment Armory, January 28-February 4, 1922.

Both national shows are under the auspices of the National Automobile Chamber of Commerce.



Is Storage of Gasolene a Nuisance?

Liability Depends Upon Manner in Which Gasolene Is Stored—Locality, Quantity and Surrounding Circumstances May Be Such as to Amount to a Nuisance—Decisions Which Have Been Handled Down by Several Courts

By Chesla C. Sherlock

The ordinary garageman—as does the average business man—may often feel that it is unnecessary for him to pay any great attention to the general principles of law surrounding the problems arising in the day's work, for the reason that he will never be brought into conflict with any serious legal situation.

The currency which this thought has everywhere among business men is remarkable, indeed. And how deceitful it really is, when one takes the trouble to consider the average business man's affairs in the cold light of legal liability.

Take a common, everyday occurrence in the garageman's experience, such as the storage of gasolene. Is it a nuisance at law? Is it such a nuisance as to enable adjoining residents to use legal means to prevent the garageman from carrying out his intention to store large quantities of gasolene on his own premises in conjunction with his business.

Garagemen may properly contend that there is nothing obnoxious in the storage of gasolene; no odors; no outrageous noises; no inconvenience to nearby residents in any particular. But is that sufficient to win their point in court in case they become involved under such an issue?

These are questions that might properly and conceivably come up in your experience any day in the year. Indeed, it is a question which is not at all new at law. It has been tried and tested in the courts of many of the states, so that the rule is now fairly well settled.

Garage owners, filling stations and merchants frequently have large quantities of gasolene stored on their premises. This is necessary for the carrying on of their business—just as necessary as the stock of goods on the merchant's shelves. The manner in which this gasolene is stored and handled is very important, as it has everything to do with the rights and liabilities of these business men to others.

Crude oil, of itself, is not a constant

source of danger and a menace to property on adjacent premises. For that reason, the courts have not been disposed to interfere as readily where crude oil is stored as they are in the case of kerosene and gasolene.

Owing to its dangerous character, the rule is different in the case of gasolene. While the mere storage of gasolene on premises adjacent to or adjoining the premises of another is not regarded at law as a private nuisance per se (of itself), the courts have said that the locality, the quantity, and the surrounding circumstances may be such as to amount to a nuisance per se and receive treatment as such at the hands of the court.

The question of whether the mere storage of gasolene is a nuisance per se does not necessarily depend upon the degree of care used in its storage, or whether every precaution that human ingenuity has conceived has been made use of in storing the oil.

One authority uses the following language: "Considering the dangerous character of the substance and its power as an explosive, of which the courts can well take judicial notice, and also considering the fact that accidents in the operation of the most perfect mechanism will occur, it cannot be said that to have a great quantity of such an agency stored within but a few feet of one's dwelling house is not sufficient to be an unreasonable interference with the comfortable enjoyment of that home."

In a Michigan case, the facts disclosed that the defendant used approximately 15,000 gallons of gasolene annually. Just previous to the filing of the notice of suit, the defendant company had purchased two steel tanks of 10,000 gallons' capacity and had commenced to excavate the ground on the rear of their lot for the purpose of burying these tanks underground. This was at a point farthest from their own buildings, but within 11 feet of the plaintiff's dwelling house.

The court gave the question of whether this storage of gasolene amounted to a nuisance considerable

attention and made an extended search of the authorities. It found that Blackstone had uttered the following rule: "A private nuisance is defined to be anything done to the hurt or annoyance of the lands, tenements or hereditaments of another."

Said the court: "The rule is of universal application that, while a man may prosecute such business as he chooses on his premises, he has no right to erect or maintain a nuisance to the injury of an adjoining proprietor or of his neighbors, even in the pursuit of a lawful trade."

However, the storage of oil or gasolene is not a nuisance per se; that is, of itself. The surrounding facts and circumstances of each case must be such as to make it a nuisance before the courts will step in and enjoin it. The mere storage of a few gallons of gasolene, in itself, is not sufficient to support such an action. There must be a sufficient quantity and other circumstances must be such as to make the storage of the gasolene or oil a nuisance to the complaining party before such an action will be heard.

The West Virginia court very ably treated the proposition when it said: "A lawful business cannot be a nuisance per se but, from its surrounding places and circumstances or the manner in which it is conducted, it may be a nuisance."

And, in this case, it was held that where oil is stored in a tank so located with respect to a dwelling house as to place it in danger and to seriously interfere with its enjoyment, it is a nuisance. In the Michigan case mentioned, it was held to be a nuisance to store 20,000 gallons of gasolene in tanks underground within a few feet of a private dwelling, although every precaution which human ingenuity has conceived had been used in the construction of the tanks.

Those who store oil and gasolene must use the utmost care and caution and, if the circumstances are such as to make it a nuisance even these measures will not prevent a court interfering.

Legal Rulings of Interest to Garagemen

Person Having Possession of Car for Washing Has No Agency to Sell—Owner Not Liable for Negligence in Driving of Repairman—Market Value of Truck Before and After Collision Considered in Assessing Damages for Injury

By R. R. Rossing

One Washing Automobile Has No Agency to Sell.

Where plaintiff bought the car of another from a person with whom it had been left to be washed, doing so at his peril and without proper inquiry, there was no presumption raised of agency to sell for the owner in the person having possession of the car to wash it.—Hopkins v. Smathers. Supreme Court of South Carolina. 104 Southeastern 30.

Dealer Not Liable to Buyer For Theft by Original Owner.

An automobile buyer, having hired a third party, from whom the seller had purchased the automobile, to teach him to operate it and to perform the mechanical work necessary to keep it in good running order, can not recover for the loss of the car from the seller, on third party's failure to return car after the purchaser had left it with the third party for repairs.—Henry v. Rozgonyi. Supreme Court of New York. 187 N. Y. Supp. 567.

Wrongful Arrest of Employee of Garage by Proprietor.

The proprietor of a garage, upon the discovery that one of his employees was using private cars for his own purpose, instigated and participated in his arrest and that of other employees not shown to have been guilty of any such wrong.

The court held that the garage owner was liable for the false imprisonment, notwithstanding that the arrest was made by police officers.—Martin vs. Woodlea Inv. Co. Kansas City Court of Appeals, Missouri. 226 Southwestern 650.

Dealer's Duty to See That Registration Has Been Changed.

Though the failure of the buyer of a registered automobile to have the registration changed, as required by Oregon laws 1919, p. 713, article 9, invalidates the sale, it does not deprive the buyer of all right to possession of the automobile, so that in an action for claim and delivery by such buyer it was an error to exclude evidence of such sale to establish the buyer's right to possession.

Laws 1919, page 713, article 9, requiring the buyer of a registered automobile to apply for a change of registration, and making a sale invalid unless the section is complied with, applies without exception,

so that a sale of a registered automobile to a dealer is invalid unless the dealer has the registration changed, though the dealer has a dealer's license, as required by the Motor Vehicle Law.—Briedwell v. Henderson, sheriff. Supreme Court of Oregon. 195 Pacific 575.

Owner Not Liable for Driving by Garage Repairman.

The owner of an automobile left it in the custody of a repairman to be put in good order, the repairman having the right to exercise control and direction over the work.

The court held that the owner of the car was not liable for a death caused by the negligence of the repairman, who was driving the car to tune it up after he had finished the repairs.—Whalen vs. Sheehan. Supreme Judicial Court of Massachusetts. 129 Northeastern 379.

Penalty for Operating Motor Line Without 'Bus License.

Defendant's operation of a motor car for hire between Albany and Troy, N. Y., charging 25 cents per trip, in competition with the trolley lines of plaintiff, was in violation of transportation corporations law. The defendant is guilty of a misdemeanor, and under the penal law, article 1937, may be punished by imprisonment for not more than one year or by fine of not more than \$1,500, notwithstanding the transportation corporations law imposed no penalty for violation.—United Traction Co. v. Smith. Supreme Court of New York. 187 N. Y. Supp. 377.

Passenger Awarded \$4,000 for Driver's Negligence.

The duty rests upon a common carrier by taxicab to be alert and watchful at all times and to exercise all the care necessary to carry his passengers safely.

A passenger has the right to presume that the carrier is familiar with the dangers to be apprehended and will use proper care, skill, and vigilance to avoid them; and owes him no duty to make suggestions or give warnings; and the failure of the passenger to protest against the manner in which he operates the taxicab, or to give warning of the likelihood of a collision with another vehicle, will not relieve him from liability for injury to the passenger resulting from his negligence.—McKellar v. Yellow Cab Co. Supreme Court of Minnesota. 181 Northwestern 348.

Measure of Damages for Injury to Motor Truck.

In an action for injury to a motor truck at a railroad crossing, the measure of damages was the difference between the market value of the truck immediately before and immediately after the collision, and not the cost of repairing the truck.—C. R. I. & G. Ry. Co. vs. Zumwalt. Court of Civil Appeals of Texas. 226 Southwestern 1080.

Property Owner's Failure to Protest Against Use as Garage.

Where a church was turned into a garage, and nearby property owners entitled to benefit of restrictive covenant against noxious business did not protest so that the buyer of the garage could assume the nearby owners were satisfied after a period of acquiescence extending over some years, the nearby owners were not in a position to restrain the use of the property so far made of such portion of the restricted area, though they could restrain a use increased over that in which they had acquiesced.—Phillips v. Dunseith. Supreme Court of Pennsylvania. 112 Atlantic 240.

Valid Exemption of Dealers From Used Car Sale Law.

The exemption of sales of new cars by licensed dealers in Louisiana from the regulations governing the sales of used automobiles by anyone, including licensed dealers, contained in act No. 193 of 1920, is a reasonable discrimination or classification, not an arbitrary one.

In view of the value and movability of automobiles, so that they are exceptionally tempting to thieves, and in view of their dangerous character when in possession of thieves, the enactment of Act No. 193 of 1920, to regulate the sale of used automobiles, was based on a reasonable distinction between automobiles and other personal property.

The provision of Act. No. 193 of 1920, article 4, relating to affidavit of destroyed or junked automobiles, is separable from the rest of the act, regulating the sale of used automobiles, so that if such provision is invalid under the state constitution. Article 31, because not within the title of the statute, the invalidity of such provision does not invalidate the entire act. State. v. Rogers. Supreme Court of Louisiana. 87 Southern 505.

Welding, Cutting and Brazing Practice

Operation of the Oxy-Acetylene Welding Torch and Equipment Is Easy to Learn—Different Parts of Welding Outfit, Uses and Misuses, Should Be Thoroughly Understood—A Few Words of Caution for the Inexperienced

By David Baxter

Anyone with average intelligence and some mechanical ability can easily learn to operate an oxy-acetylene welding torch, its accompaniment of generators, regulators and other equipment. The automotive repairman or garage mechanic is particularly fitted for this class of work, due to his experience with different metals, both in a cold and heated state. Nowadays the welding plant is just as essential in the automotive repair department as the lathe, forge, or other machine or tool. In fact, it is indispensable to the shop owner who knows the capabilities of this apparatus for all lines of automotive repairing.

It is not difficult to learn to weld, although it requires considerable skill to make good welds under all circumstances. This comes with practice, however, if the torch operator pays attention and applies himself to the task of learning. He must use his head as well as his hands.

Probably the first thing for the beginner—and it is very essential too—is to thoroughly understand the different parts of his welding outfit, their uses and misuses. Not only how to operate it, but how to take care of the plant in order to keep it in efficient working order.

Therefore, let us first consider, in turn, all of the elements that go to make up the oxy-acetylene welding process. Let us consider the different parts of the modern welding and cutting outfit, dealing with each in such manner that the novice may follow these articles and obtain what is practically a complete course in welding.

It is obviously impracticable to describe any specific make or style of welding outfit, for there are quite a large number on the market, each of which have some little difference in mechanical construction. Nor will any attempt be made to furnish instruction for the operation of any particular brand of equipment, except insofar as it has a general bearing on all of them, for each manufacturer will gladly furnish complete data for setting up and operating his machine, such as for loading and adjusting the acetylene generator. The chief aim of the article will be to furnish information which the manufacturer usually omits—the things the beginner must learn by experience.

Let us first consider the oxygen container or tank and its contents. There may be a few isolated cases where the welders are still using the old method of obtaining oxygen by "cooking" chemicals. As a general rule, however, this element of the welding process is now furnished in drawn steel

Due to the advances in many lines of the welding business, the changes in methods and equipment, and the ever-increasing number of beginners in the art of oxy-acetylene welding, the fundamentals of the entire process will be discussed in a new series of articles in this department.

These will be so arranged that if the reader will save each month's issue, he will, in the end, possess a complete book on automotive welding.

drums or tanks, the chief exception being where large consumers use oxygen direct from special generators.

The element, oxygen, which is usually compressed in the steel drums to about 1,800 pounds pressure, constitutes about one-fifth of the air we breathe and eight-ninths by weight of all the water on the earth. It is tasteless and colorless, and



"Rolling the Tank Like This Is a Great Deal Easier Than Carrying It."

will not burn alone. But it is essential to all combustion.

Under certain conditions oxygen, coming in contact with oil will form an explosive; this is the reason all welders are specifically cautioned to keep oil away from oxygen drums and their connections. Never

put oil of any kind on any threads or valves through which oxygen passes.

In spite of the 1,800 pounds pressure, a loaded oxygen tank is not dangerous if treated rightly. It should not be handled roughly or carelessly. Perhaps the easiest way to move it is to tilt it so one side of the base rests on the floor and the cap or the valve rests in one hand. In this position it may be rolled along a great deal more rapidly than by carrying or dragging, and is not half the hard labor.

Care should be taken to not drop a loaded tank, as this could result disastrously. Instances are recorded where loaded oxygen drums have hurled themselves through the sides of a building when the valve casting was accidentally knocked off.

While in use, the oxygen drum should always be fastened in an upright position to render the best service and to be the safest. On account of its long, narrow shape, it is easily knocked over, which usually results in a demolished regulator if nothing else. The tank should, therefore, always be chained or otherwise fastened to the wall of the shop or to the truck if one is used. Then it cannot be jerked over by some one tripping over the hose.

The reason for keeping the oxygen drum in an upright position is that any impurity, such as water or sediment, will naturally settle to the bottom and, therefore, be less liable to be drawn out through the hose.

The manufacturer of oxygen uses every means in his power to produce strictly pure gas, but his employees are human, liable to make mistakes or get careless. Therefore, it sometimes happens that there is moisture in the loaded tank, which, if it enters the torch, will have an adverse effect upon the welding flame. In this connection it is well to test each tank before using, besides keeping it on end before and while using.

The simplest test is to invert the tank for several minutes to allow the moisture to gather around the valve. Then open the outlet valve quickly for a few seconds. If any water is present, it will be expelled by the pressure of the escaping gas.

This test is good in another instance, too! In transit or in the shop, it sometimes happens that a little dirt or dried mud adheres to the inside of the valve outlet. This substance should be blown, first scraping it loose with a sharp pine stick and then expelling it the same as the moisture.

In storage, the extra tanks should be

kept on end for the reasons previously given. They should not be left out in the hot sun, nor should the storage space be exposed to cold. The ideal storage is one where the temperature is about 70 de-



"Invert the Oxygen Tank and Open the Valve to Eject Moisture."

grees all the time. This gives the best, constantly dependable results in the propagation of the welding flame. Heat causes oxygen to expand and cold causes it to contract. Of course, the drums are made strong enough to withstand reasonable expansion, but it should be plain what the expansion would do in case of fire.

In this case, however, the manufacturer has made provision. On the brass valve casting opposite the outlet is a small hexagon nut through which runs a soft metal core. Before the heat of the fire increases the pressure sufficiently to cause the tank to be in danger of exploding, this core will melt and run or be blown out, thus allowing the gas to escape gradually.

The melting point of the soft core is low enough to permit it to melt readily and yet is high enough that it will not melt under ordinary circumstances. It is inserted in the nut in such manner that there is practically no danger of blowing out without first melting.

In connection with the safety plug it might be well to caution the novice about removing or even loosening this nut, either from a curious desire to know how it is made or from plain thoughtlessness. The result would be the same as opening the outlet valve wide.

While our attention is directed to the valve casting, let us see what other points are worth remembering. Each valve is provided with a small hand wheel with which to open the valve. It is not necessary to open the valve wide when it is in use, but the wheel should be turned several times. However, this is not so particular as the matter of closing the valve.

This should always be done by hand alone—a wrench should not be applied as it is almost as bad practice to close the

valve too tightly as it is not to close it tightly enough. If a wrench is used, the valve tends to grind upon the seat and destroy its surface, which renders the valve leakable. It can scarcely ever be closed tightly enough again to prevent the oxygen from escaping, especially if the tank is full.

In further consideration of the matter of closing the valve, it is well worth any welder's while to be sure to close the valve whenever he is through using it, especially during the noon hour and at the close of the work day. Many expert welders give but scant attention to this as most of them never received any instructions to do it.

It will be found that at the end of the year a great many feet of gas have been saved through the simple practice of closing the valve when the oxygen is not being used. This is particularly true if the regulators and torches have been in service for a year or more. Such equipment is



"This Is the Safety Nut—Tampering With It Is Indefensible."

almost certain to develop a leak in some of the valves or other connections, which results in a slow waste of oxygen the moment the flame is extinguished.

The long screwcap which is always in place when the tank leaves the filling station, should not be removed until the tank is ready to be put into commission—and it should be replaced as soon as the tank is empty or is disconnected.

This cap is for the purpose of protecting the valve casting and hand wheel. It prevents the wheel from being opened in transit, either accidentally or by some ignorant person. It also protects the outlet threads and seat from being damaged. However in spite of all precautions, the threads are often damaged. Even the welder sometimes damages them himself by stripping

them, due to not holding the regulator level while attaching it.

In any event, if the thread is damaged considerably, the tank should be returned to the agent for repairs, as the average welder is not properly equipped for this work. The welder should not endeavor to make the threads work easier by applying oil for, as previously stated, oxygen under pressure and certain velocity, when coming in contact with oil forms a powerful explosive. Any kind of oil is meant, even some kinds of soap or white lead.

If the welder attempts to follow any theory or given rules for adjusting and manipulating the welding flame, he should know these rules are given for use where everything is in good condition. Any deflection from the conditions enumerated is liable to cause the flame to act differently from what instructions give. For instance, if the drum has been allowed to stand out in the hot sun all day, the flame will act differently than if the drum has been out in freezing weather. Or if moisture is present, it cuts down the temperature of the flame, even though it may be possible to adjust the flame to the proper size and color.

Again, if a little grit or dust is permitted to remain in the outlet when the regulator is attached, it may find its way into the regulator or even work on into the mixing chamber of the torch, where it may cause a lot of trouble. The flame will sputter or



"A Portable Outfit Is Almost Indispensable in Any Shop."

"pop out," thus spoiling an important weld or at least causing the loss of a lot of time.

All of these little details count for a great deal in scientific welding. Of course, (Concluded on page 36)

Importance of Suitable Lubrication

Attention to Lubrication Has Saved Many a Good Machine from the "Junk" Heap—Different Lubricants Required for Different Purposes—Lubricant Recommended by Car or Machinery Maker Generally Proves Most Satisfactory

By J. N. Bagley

Among the most important things to consider in running the automobile is the lubrication. In fact, the efficiency of the automobile depends wholly upon the quality and the manner of lubrication. It seems that

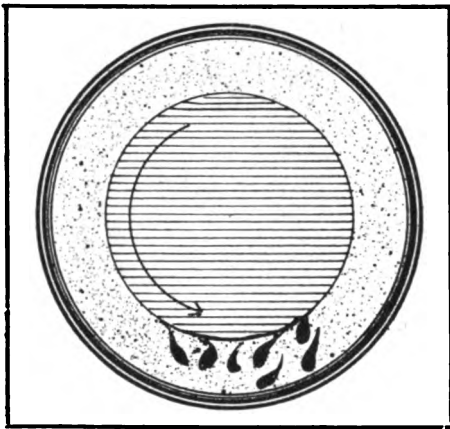


Fig. 1—Action of Globules in Lubricating.

in this day and age of the world, advanced as we are in engineering matters, there is not enough importance and stress placed upon lubrication; not only of motor cars but of every other type of machinery with which we have to deal.

Of course, the owner of the motor car can be forgiven to some extent, but so far as the machinist is concerned, there is no excuse whatever except pure carelessness.

The lubrication of the present-day motor car is somewhat more complex, as it presents a series of problems differing entirely from other machines. This is due to the fact that different lubricants should be used for different purposes. For instance, the lubricant used to lubricate the shackle bolts would be worthless for lubricating the engine. Then again the transmission will require an entirely different lubricant from either the engine or the spring shackles, springs, etc., and so on down the line.

When the lubrication is neglected, the wearing surface is soon cut or worn sufficiently to affect the working of the machine, if not rendering it entirely useless.

A great many of the dealers do not lay stress enough on the lubrication of the cars they sell. As a result, many times, a car gives only partial service and causes the owner to become disappointed in that particular make of car and perhaps to say many disrespectful things about it to his neighbors, thus affecting other possible prospects in his territory.

The writer calls to mind, at this time, a

car dealer who makes it a point to see that all the cars he sells are properly lubricated for one year from the time they leave his place. He charges the car owner for the lubricant only and charges the labor to the free-service side of the ledger.

I asked him one day if it aided him in dollars and cents to give this service free of charge. He then told me of his free-service plan not only so far as lubrication was concerned but other things. He also stated that in the course of a year he would impress on the customer's mind the importance of lubrication so that he would never forget it.

And he was right for, to satisfy myself, some time after this conversation I asked every man that I saw driving one of the particular make of cars handled by

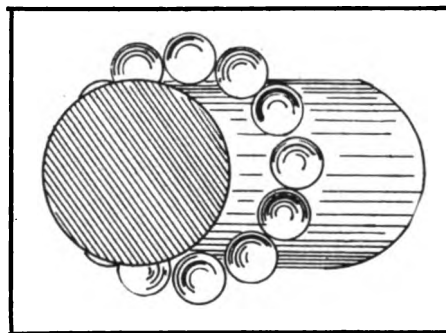


Fig. 2—How the Ball Bearings Work.

this dealer how he liked it and whether he would buy another of the same make if he were buying again. Not a single man failed to have words of praise for both the car and dealer.

The natural tendency of most people owning cars is to lubricate all the different movable parts with the same lubricant. Many parts are overlooked and not lubricated at all. It is a fact that the use of a single lubricant for all the different parts would be handy, to say the least—but the sooner we get this out of our minds and study correct lubrication, the sooner we are going to double and triple our mileage with less running expense.

Defective lubrication leads to two possible results, both of which are expensive and very inconvenient. It may result in the car being laid up for repair in some out-of-the-way place where assistance is very difficult to obtain. One thing sure, it will always increase the cost of running.

Most motor car users know only too well that the repair bills are the items of impor-

tance and wish to avoid them as much as possible. Correct lubrication will, in every instance, reduce them more than 50 per cent, for lubrication reduces friction and when friction is reduced, repair bills are reduced proportionately.

Where two pieces of metal come together, rolling around or sliding over each other, there must be friction. The amount of friction depends upon the lubrication. Friction absorbs power. Increased friction absorbs more power and, if allowed to persist, it leads to partial or permanent disablement in every instance.

A very good illustration of this fact is to take two pieces of highly-polished steel and lay one flat on a bench and rub the other over it for a few strokes, using a little pressure. Now place a few drops of oil on the surface of one of them and try again. The result is that the friction has been reduced and the top block will move as if it had rollers under it.

The lubricant has reduced the friction to a minimum, and it will also be noted that very little effort is required to do what was done before the lubricant was placed on the steel.

This only goes to prove that under the most favorable conditions, with the very best of lubricants that can be obtained and with the most carefully-machined surfaces, there will still be a certain amount of friction to overcome. In other words, there is yet some charge upon power to be overcome. Now take the pistons, for example, no matter how well they may be lubricated—no

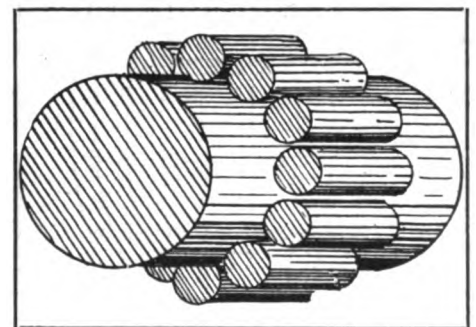


Fig. 3—Workings of Roller Bearings Commonly Used.

matter how much polish the walls of the cylinder may have—there is friction.

It is common knowledge that a comparatively small amount of the power delivered by the pistons of the engine in the cylinders is actually employed in driving the car over the road. A portion of this power is

used up in moving the piston, and, as it comes to rest at each end of the stroke again, power is required to maneuver it.

Going on down the line, as we leave the pistons, we come to the crankshaft working in its bearings and the friction of the gears as they slide over each other. There is friction again in the axle bearings and friction between the tire and the surface of the road. In fact, there is friction all the way down from the very beginning.

How much of this power is used up in friction is governed by the quality and quantity of lubrication. If none of the parts mentioned were lubricated, it is very doubtful if the engine could overcome the friction sufficiently to move the car, or even run idle. Therefore, everything depends upon lubrication.

Power is transmitted from one gear wheel to the other by the aid of friction, and again we have the peculiar feature that a certain amount of friction between the teeth, as they slide over each other, is absolutely necessary or no power can be transmitted. On the other hand, this friction must be reduced to the lowest possible amount consistent with certain transmission of power.

In the case of the cylinder a different set of conditions is introduced than those just mentioned. The piston moves up and down at a very rapid rate and is subjected to a very high temperature. Therefore, a lubricant with a fire test must be employed.

In choosing a lubricant for the gasoline

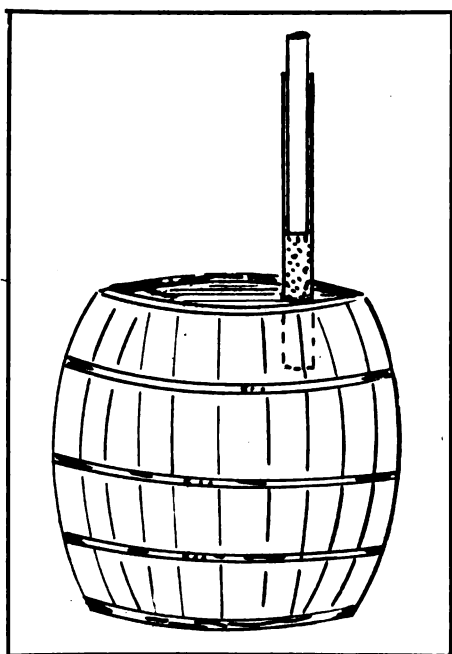


Fig. 5—Pressure Furnished by Weight on Sliding Tube.

engine, we must not forget that it is nothing more than a hot air engine, or a hot gasoline engine, whichever we may term it. The power is produced by the sudden expansion of the gasoline in the combustion chamber when it is ignited.

Just before the charge is ignited, a quantity of atmospheric air is mixed with a smaller quantity of hydrocarbon vapor. This mixture, under compression, is highly explosive and the hydrocarbon vapor should burn completely. When it does, the

This high temperature of heat is generated so rapidly that it is impossible to radiate it away fast enough to prevent the cylinder, piston, etc., from maintaining high temperature while the engine is in operation. The lubricant, therefore, must be of such



Fig. 4—Showing Action of Gear Wheel in Lubricating.

temperature in the cylinder of the engine rises very rapidly.

Of course, a very large quantity of the heat is eliminated through the exhaust valves, but there are about 3,600 degrees Fahrenheit of heat due to the gas that has suddenly expanded at the rate of about 1/460th of its volume for every degree increase in temperature. The result of this increase in temperature is an attempt, on the part of the mixture of nitrogen, carbonic acid and steam produced by the combustion of the charge, to occupy a very much larger space in the infinitesimally short time it is expanding.

It will readily be seen that the explosion of burning gases is of short duration and the tendency, therefore, is to scorch rather than to burn the lubricant. It is easy to understand why it is necessary to have a lubricant that will stand a high-fire test to keep the piston, as well as the walls of the cylinder, lubricated.

In case a lubricant is used that does not have the necessary fire test to keep the piston and the walls of the cylinder lubricated, it will be but a matter of a few seconds until the piston will seize in the cylinder. Usually, before the seize, the walls of the cylinder are scored many times—sufficiently to render them useless.

It will readily be understood that, from the moment of ignition, the temperature of the mixed gases commences to fall—partly owing to the work done in forcing the piston downward and partly owing to the fact that a portion of the heat is carried, or radiated, away by the walls of the cylinder, water jacket, etc.

fire test that it will stand up and properly lubricate the cylinder and piston under this constant heat.

We must also consider the fact that, in the case of the present-day engine, the in-

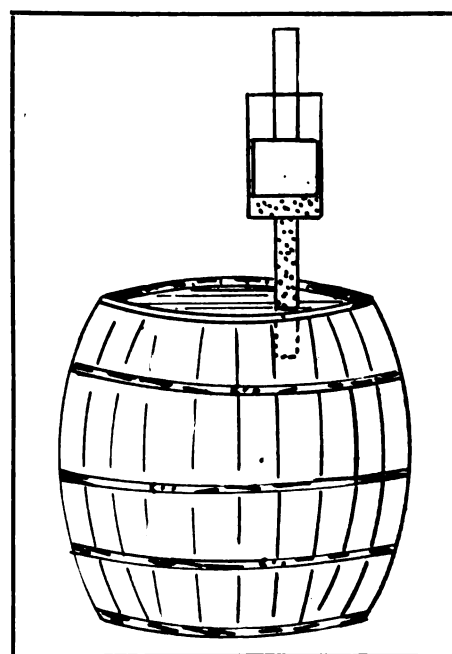


Fig. 6—Pressure Furnished by Piston Moving in Cylinder.

creasing speeds have to do with the temperature of the engine, for the faster the motor turns over, the more often the charge is ignited. Consequently, the temperature must rise to keep pace. It will be readily understood therefore why racing cars and

(Continued on page 35)

Better Driving Light at a Small Cost

Good Driving Light Dependent Upon Correct Installation of the Headlight—Two Important Adjustments Necessary—Dealer May Help by Insisting that Manufacturer Mount Headlights So as to Be Easily Adjustable

By Robert Livingstone

As state after state passes headlight laws requiring better light on the road and less glare above the level of the headlights, car owners are bound to take more interest in their headlights than in the past.

It used to be that any old kind of a light was good enough, but now something better is being demanded. The headlight is rapidly coming to be considered as an important part of the car instead of just something that was stuck on as an afterthought.

Partly owing to the negligence of the car manufacturers—practically none of whom have attempted to inform their agents and service men regarding the construction and adjustment of headlights—the average repairman has seldom had to do anything more serious in the way of servicing them than to install new bulbs once in a while.

Often a job like this, which should be very simple indeed, has become a big task because the headlight was poorly constructed in the first place and neglected thereafter. Probably the rims were jammed or rusted on and usually the bulb socket was out of order so the important work of focusing could not be done properly.

This condition will pass sooner or later. The car manufacturer will wake up to the importance of furnishing efficient headlight equipment, just as he has improved other details of his cars—and he will take pains to see that users of his cars are informed how to make it operate to best advantage.

In the meantime, especially in states where headlight laws are calling the attention of motorists to the inadequacy of their headlights, there is a harvest for the repairman who studies up on the subject and prepares to help his customers out with their problem of complying with the law.

Where there are no laws, the opportunity exists just the same, because any motorist will be interested when he learns that it is possible for him to have better light at very little cost. True, a car can run without very good driving light and, as a matter of fact, not one car in a hundred has anything like the light that its present equipment could give it.

Now the average motorist wants better light whether the law compels him to have it or not, and where there happen to be laws, the laws are calling his attention to his lights so that the repairman has most of his advertising done for him free.

There are two important adjustments of headlights. The first is the proper point-

ing of the headlight itself so that the beam of light it throws will go in the right direction. It is like pointing a camera at the scene you want to photograph, or aiming a gun where you want it to shoot. Even this simple adjustment seems to be beyond the ability of the average car owner to understand.

We have seen car after car pass on the roads with one headlight pointed off into

It's Team-work That Wins.

The man who is really valuable in an organization, whether he is a subordinate or an executive, is the one who realizes that it is an organization and that his own success must be built upon the success of the men around him. You have got to pull with and for the other fellow. A man who isn't willing to share his success with others won't have much success to put in his own pockets.—H. S. Firestone.

the fields and the other pointed up in the trees—and doubtless the drivers never stopped to think that their light on the road would be improved if the headlights were simply aimed at the road instead of somewhere else.

A very few of the car manufacturers have taken pains to mount their headlights on brackets that are practically universal joints, so that by loosening a nut they can easily be pointed in any direction. Studebaker, Hupmobile, and Pierce Arrow show typical examples of good headlight mounting. They are to be commended for stepping out ahead of the average.

Other manufacturers mount their headlights on brackets that allow movement in only one direction—for instance, the Dodge, the headlights of which can easily be swung from side to side but can not be tilted up or down without springing the whole fenders at the risk of tearing out a few rivets.

On the Buick, Oakland, and Olds, the headlights are mounted on the sloping part of the inside of the fender, with what appears at first sight to be a universal adjustment but turns out to be only an adjustment in a diagonal direction. When you try to tip a headlight up it swings out to the side at the same time.

Still other manufacturers apparently assume that a headlight will never have to be pointed in any other direction than the one the assembler happens to choose when putting the car together. So they mount

their lights so solidly that one wants to call for a crowbar or a charge of dynamite every time he has to make any change in the pointing of them.

The big, expensive cars are usually the worst offenders in this respect because they go in for massiveness and rigidity, using steel castings or forgings that practically can not be moved from their original position. Often the easy expedient of drilling a couple of bolt holes a little bit oversize would simplify the whole matter, but it isn't done. With a car like the Ford, the pointing can be done easily because the brackets are light enough to be bent by hand, but when it comes to a Winton or a Stearns it is another story.

The car dealer can do a great deal to help the situation along by writing to the manufacturer of the car he handles and insisting that the headlights be mounted in a reasonable way. It is almost certain that some of these mountings are more of a matter of oversight than intention.

But, while the dealer waits for the happy day to come, he can inform himself as to the methods of pointing headlights as they exist and making them work as well as possible under the handicap that the manufacturer has set for him.

This is especially important when lenses are installed to improve the distribution of light on the road, because every lens is designed to be operated with the headlights pointing in some particular direction. If the headlights are pointed in any other direction—that is, if they are tipped up or down or sideways—the lenses will not do what they are supposed to do. Probably they will neither give good light on the road nor stop the glare.

The law does not concern itself so much with the fact that lenses are used as with whether they are installed correctly. Motorists are often under the impression that they are complying with the law just because they have lenses in their headlights. If the headlights are pointed wrong, or if the bulbs are focused wrong, the lenses might as well be under the seat of the car so far as legality is concerned.

Therefore, if prismatic lenses are used, the lens makers' instructions must be carefully followed. Some lenses are efficient enough to be legal when the headlights are exactly vertical. Others may require a slight tilt. With all lenses the headlights must point straight ahead of the car; that is, they must throw parallel beams of light. The proper pointing of the headlights is as important as focusing the bulbs correctly

for the particular make of lens that is used. It must be done carefully or the results will not be satisfactory to the user or to the police.

If the headlights are mounted on forks, the best way to tip them up or down is to take the lamps off the forks and bend the upper ends of the forks with a wrench or a two-foot piece of gaspipe. This is much better than trying to bend the whole fork and less liable to break something. Take it easy. Only a small amount of bending will be needed. Springing the tip of the fork as little as 1/16th of an inch may move the light a foot on the road a hundred feet ahead of the car.

If the headlights are mounted on brackets attached to the fenders, you will usually find that the bolt holes in the brackets are slotted. Simply loosen the bolts and then, using thin wooden wedges between fender and the bracket if necessary, you can point the headlight wherever you wish.

After pointing the headlights correctly, the second adjustment is to be made—the focusing of the bulbs, which will be taken up in another article.

Complete Motorization of Cities and States Is Predicted.

Motorization of cities is going to be carried out in the not very distant future,

according to Arthur T. Murray, president of the Bethlehem Motors Corp.

"Horses cumber the streets in cities like Detroit, Los Angeles, Chicago, and New York, where motor cars prevail in such numbers," said he. "The horse must go from the very scheme of things.

"Just as big business concerns motorized their equipment and ultimately got rid of the horses, just as street car lines adopted electricity and got rid of their horses, just as farmers are going to motorize and rid themselves of horses, just as fire departments and city departments gave up horses for the motor, so will cities and even states finally turn entirely to the motor."

Do You Read Your Trade Paper?

Reading of the Methods Which Are Being Used by Other Men Is Stimulating and Aids Constructive Thought—Your Trade Papers Will Give You Many New Ideas for "Brushing Up" Your Business and Saving Time and Money

By Frank E. Morriss

Doubtless there are those benighted souls in the Universe who are so surrounded by work that they can find time to do nothing else. Usually you will walk into the office of one of this species, and see lying about, covered with newspapers, dust and what-not, an unopened copy of the trade magazine to which they subscribe.

If you will dig deep enough, you will find more than one copy and, perhaps, several copies of various trade magazines. Right then and there, set it down in your little memorandum book against this shop, under the heading of "proprietor" the word "bonehead." A man who hasn't time to learn how the other fellow, in his home or distant towns, is doing it, is a fool after his own folly.

Many a man has proved himself a failure through depending upon his own methods and efforts, only to be pulled out of the mire of despond by reading in the columns of his trade magazine, an idea put into practice by another man in the same line.

A short time ago, walking into a garage, I looked about for the proprietor—and truly it was a look, because torn-down machines were standing here and there, in no order whatsoever; parts were jumbled and thrown about; open receptacles containing gasoline were everywhere, and the floor was full of dirty waste and grease.

The proprietor was lying underneath a car, and when he came from under, his appearance—for a workman in a garage—reminded me of the word "hobo." He was indeed a hobo garage-owner.

My object in going into the place was to sell him a collection system for getting his money from delinquents. I knew he needed such an aid the moment I realized, from the appearance of the place, how lacking in efficiency he must be.

Going into his office I noticed a copy of the AMERICAN GARAGE & AUTO DEALER, done up, just as it had left the mailing desk in Chicago.

"Right here," said I, "I will sell this fellow more than one thing today."

Before starting a sales talk on the system, he was queried as to why he never opened the magazine.

"Too busy!" That was enough—and that fellow received such a lecture as no mortal had ever had before on the value of keeping tools, parts and cars in order, so that his shop would accommodate more cars, and permit of better work on the part of the mechanics.

He was shown that some things he could do would save time and serve to get jobs out more quickly; that he could safeguard his men from accident; reduce his fire hazard, and all, as a final analysis, would be the saving of cash for himself.

Then he was told and shown that in the pages of the trade magazine he was too busy to read, he could find those very ideas and many more set forth with a clearness, making them applicable to his business in such ways as to cause him to appreciate the magazine more and more, and to look forward to its arrival with pleasure.

Today, that garageman is looking for larger quarters, and he has thanked me many times for the lecture read him that day.

To prove to any one how far-reaching is the effect of untidiness in any business, which leads to a personal untidiness—a garage-owner in a small town had the agency for a small car. He sold a great number of them; but his sales were made more on the popularity of the car and the great demand for the product than on the man's personality and salesmanship.

Hearing of the number of cars being sold through this man, the manufacturers of another car, seeking an outlet in the same market, invited him to their factory with a view of interesting him in their agency for the same district, but with headquarters in a larger city, where he could more readily grow into something proportionate to the occasion.

The sales department had never seen this man—they had just heard what a "whopper" he was at selling the other car. The man was very untidy in appearance, shaved when he felt like it—usually Saturday night—and shined his shoes once in a while.

Before he left to attend the conference about the new agency, his wife, a tidy woman and one who has a great deal of business brains, spoke to him about having his trousers pressed and taking along an extra suit of clothes.

Mr. Man was an egotist and actually told her that he would go just as he was, that pressing, shaving and shining were not necessary adjuncts to selling cars. His wife has told me many times since that the lack of pressing, shaving and shining lost him the agency.

Read your trade paper, brother garageman and dealers in all lines of accessories.

In addition to pressing your pants, shaving your mug and shining your shoes, do a little of the same brushing up for your business.

In the columns of your trade papers you will learn how others are improving their plants, and improving their business by keeping step with the trend of events.

Let it be said of your place that you are trying all of the time to please the average customer, and the average customer is half won by a wholesome atmosphere.

Glimpses in the Garageman's World

Minnesota Garage Adds Air Space to Shop Through the Use of Unique Roof Construction—Let Motorists Know About Your Shop by Means of Judicious Advertising—Two Garages Which Present an Interesting Contrast in Progress

They Never Pass This Garage Up. Why?

Out in Byron, Minn.—a town boasting of only a few hundreds in population—is a modern, up-to-date, steam-heated and electric-lighted garage, which towns many times the size of Byron might well envy.

It is on the "Black and Yellow" trail, and no motorist traveling along this route need feel the least fear that he may not be able to find service, for he has only to visit W. F. Sparrow & Sons' garage in order to have his automotive wants or repairs promptly, efficiently and completely cared for.

In one of the illustrations you will note the attractive front of the Sparrow garage, with its effective display windows and the modern outside equipment for supplying the traveler with gasoline, etc.

In another of the illustrations on this page, you may see the office of the Sparrow garage, with its well-arranged show-cases of automotive accessories and well-stocked shelves.

Did we hear you say "What a dandy workshop"? That's what we thought, too, when we looked at the photograph from which our illustration was made. First, there's the roof construction, giving considerable additional air space. The shop is spacious, well-lighted, and completely equipped.

And then, in passing, we can't help com-

menting on the personnel of the shop. Real "doers", everyone of them. Shouldn't you say so? We'll wager a car they get for repairs comes out of that shop in record time, all right—and in first-class shape, too.

as the garageman screwed on the cap of the gasoline tank after refilling it.

"Fourteen miles," he answered, and with a "So long!" and a thought about how far apart towns are in the West, I started the car and we were off for another lap of our journey through the Corn Belt. The car had been behaving handsomely since we left home a week before. Nothing had happened to delay us, but about five miles out from that town—Zip! went the fan belt.

Of course, I didn't have another. So what was I to do? Go back five miles by slow stages or try to make the next town, nine miles away, by still slower stages. The sensible thing seemed to be to go back, and

I was turning around when the wife, who has eyes like a hawk, chimed in: "What are those buildings ahead? Looks like more than just a farm. I guess it is a village."

"What of it?" I answered rather crossly. "A place like that wouldn't have a garage."

"It might. You'd better go on and see." "It mightn't," I snapped out, "What's the use of fooling around like that?"

"Well, if you'd taken my advice and carried an extra fan belt, you wouldn't be in this fix. Be pigheaded now, if you want to, but I'll bet there's a garage there. looks like a sign."

"I do too," piped up the kid hopefully.



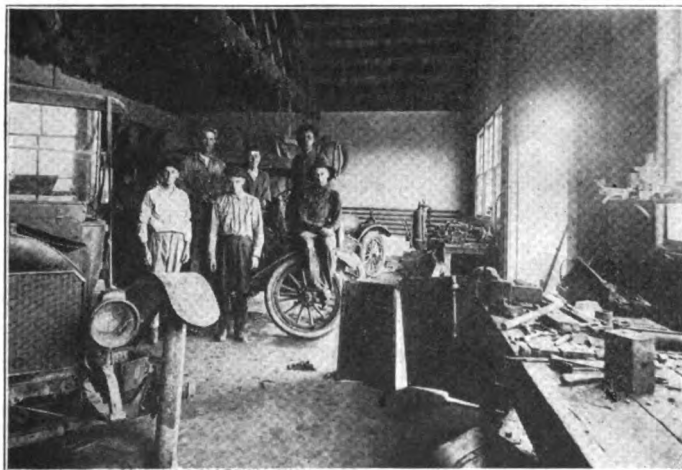
On the Black and Yellow Trail, This Byron, Minn., Garage Is Ready to Serve All Comers Promptly and Completely.

Since this photograph was made, we are informed that a water-pressure tank has been installed which gives the Sparrow garage all the advantages of city water, and with practically no additional overhead expense, since the motor which runs their lathes, etc., pumps the water to the tank.

We should say that the Sparrow garage is the best possible refutation of the argument sometimes heard that it doesn't pay to attempt to build an up-to-date garage, and equip it with modern and efficient machinery and tools, in a small town. It doesn't pay to do otherwise!

Advertising Your Shop.

"How far to the next town?" I asked



Plenty of Air, Light and Space in Busy Workshop of Sparrow Bros.' Splendidly Equipped Garage.



Your Automotive Needs Will Be Supplied Here.—Note the Attractively Arranged and Well-Stocked Showcases.

With the whole family against me, I gave in and drove on. It turned out to be a village with about eight houses, a store with a Bell telephone sign hanging out, two boarded-up buildings which looked like the place had seen better days; and across the road—if there wasn't a sign! "GARAGE."

Of course, the wife said, "There, what did I tell you," and the kid joined in with, "I saw it too"—but I was too pleased to get mad. The building was an old one like the other boarded-up ones and not much for looks, but an energetic, smiling young fellow hustled out as I stopped.

"Busted a fan belt. Got one?" I said.

"Sure," and in a minute he was out putting it on.

"Funny to find a garage in a place as small as this," I said while he was doing it.

"That's what they all say, but they seem to find it handy. I've no kick on business. Have all I can do."

"Lots of tourists stop?"

"Yes, a good many since I put the sign across the road. Before that, they never knew there was a shop. Nobody ever slows down for a place the size of this. The only way to get them is to swing a sign right over the road.

"But tourist business isn't the best part. All the farmers around here have cars and a good many trucks and tractors. It's nearer to come here than it is to go to town, so I'm getting most of their repair work. The town garageman laughed at me when I started up here. Thought it was a joke.

"But I was tired working long hours for the other fellow in a town garage. I didn't have any money to start up in town for myself, so I took a chance and came out here. I'm working long hours all right, but one doesn't mind when they're making money for themselves. There's a lot of villages around here where I bet fellows could do well with an automotive shop.

"Pick a place. I tell them, where the farmers have their farms pretty well motorized, then get into a village which has a tourist road through it. It doesn't make any difference how small a village it is,

but it ought to be several miles from a town. Then hang a sign out over the road. You know most villages are on popular motor routes, for the pioneers laid out the trails and built villages along them, and they laid them out so well that

At the left, we have the modern, up-to-date garage, with attractively-arranged display windows and conveniently-placed front entrance.

Each establishment handles two makes of car—but what a difference in the meth-



Who Wouldn't Observe the Beauty of Finish and Line of These Cars? There's Nothing Else to See.

they're still the best-traveled of all roads.

"I have a hunch that every village is going to have an automotive shop some day," he finished with a laugh, as I paid him.

"A pretty good hunch, at least from the motorist's point of view, I'll say," I thought, realizing the time his village shop saved me. "I'll pass the idea along."

And I have.

A Contrast in Progress.

It would seem that the two establishments shown in the illustrations below might quite appropriately be labeled "Modern vs. Old Construction," so marked a contrast do they present.

In the one to the right we see what is quite evidently an old store building which has been adapted by the owner for an automobile sales shop, with the car entrance at rear of the building.

nd of display! In the one case the cars are pleasingly arranged in the spacious windows, without crowding.

In the other case, the unattractive, crowded appearance would be very unlikely to offer any inducement whatever to the average passerby to give a second look to the cars offered for sale.

A Display Window That Sells.

That a display window may be a real "silent salesman" is, of course, a recognized fact. A crowded display window undoubtedly repels interest rather than attracting it. And that is one of the reasons for the effectiveness of the display room seen in the illustration above.

The absence of chairs and decorations of any kind—the three automobiles and small advertising sign being the only objects in the room—gives a pleasing impression of spaciousness and makes the cars stand out.



Up-to-Date, Isn't It? Note Contrast Which Is Offered by the Opposite Illustration.

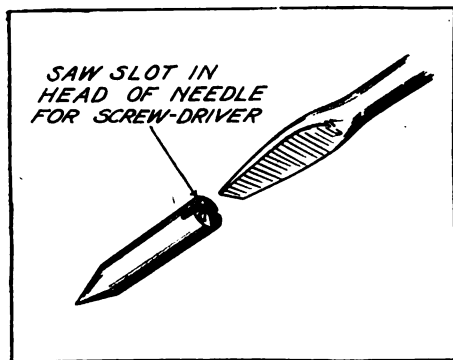


Not Many Like This Now.—Progressive Garagemen Building Many Like Building on Left.

Practical Hints for Shop Mechanics

Remedy for Carbureter Leaking.

To stop a Holley or Kingston carbureter from leaking when the inlet needle is not seating properly, take the carbureter apart and saw a slot in the needle valve as shown. Put some fine valve grind-



Will Prevent Carbureter From Leaking.

ing compound on the other end of the needle, place in the seat, and work back and forth with a screwdriver.

Wash out all grinding compound and assemble carbureter, being sure that the float is adjusted so that it will close the inlet needle valve.—M. W., Wash.

Ford Generator Hint.

When the screws have been removed from the ring on the end of the Ford generator, much time is frequently lost in reassembling, as the ring must be put on in a certain position or the screw holes will not correspond. Make sure of the position by punch-marking the case and ring before removing the screws.—R. W. T., Mo.

Parts Boxes.

Small nuts, rivets, washers, cotters, small parts, etc., are usually kept loose on the bench top or in large boxes, mixed up until it is practically impossible to find what is wanted.

Much time and trouble is saved by making a dozen or so small tin boxes about six inches square by one inch deep for these parts. These boxes may be made of scrap tin and soldered up at odd times at a very small cost.—D. & F., Mo.

Inner Tube Assists Tire Repairman.

One's arms soon become tired when a number of treads are to be ground off large casings before retreading them. If a hoop is placed in the ceiling over and just in front of the rasp, the casings may be suspended and the work made much easier.

An old inner tube should be fastened to the hook by means of a small piece of rope. The lower end of the tube should carry a steel hoop of such size and shape

as to carry the tires easily. If extra heavy tires are to be worked on, it is sometimes necessary to use two tubes.

This method takes the entire weight of the tire off the workman and the tubes furnish the necessary flexibility to enable the work to be held in any position. Old tubes are to be had around any garage so that the apparatus is very inexpensive as well as helpful.—G. S. E., Iowa.

Stops Rusted Rims from Cutting.

On old and rusty rims, tires easily become rim-cut, and sometimes the rust cuts the tube.

Now, to prevent the rims from cutting the tube, I use an old automobile tube of the same size as the shoe, cut lengthwise. This gives two protectors. In small size shoes, as those on a Ford, no protector comes with the tube; so I use these.

My patrons tell others about my way of helping them save tires, and so I get more trade than I would otherwise.—P. N. A., N. Y.

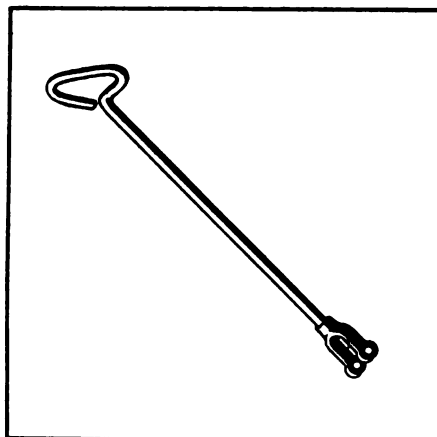
Device for Locating Knocks.

Remove the spout and drill a quarter-inch hole in the bottom of an ordinary squirt oil can. Thread one end of a quarter-inch steel rod two feet long. Put a nut on and insert the end in the can. Put another nut inside the can and tighten them.

By placing the rod against the motor here and there, with the ear held to the spout opening, baffling clicks and knocks are more easily located.—C. O., Neb.

Ford Oil Petcock Opener.

A Ford oil petcock opener can easily be made from an old Ford hub brake pull rod. Cut the rod off about 2 ft. 6 ins.



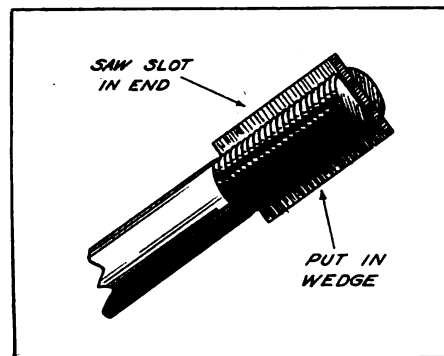
Easily Made Ford Oil Petcock Opener.

from the end of the rod, which is made to be attached to the hub brake shaft lever.

Then bend the handle to suit, as shown in the illustration. This makes a convenient tool.—A. R. E., Mo.

Repair for Worn Threading.

If the threads on a steering-gear cross-rod are badly worn, making a wobbly and dangerous connection, instead of buying a new rod just remove the rod and enlarge the worn end by cutting it lengthwise for



Method for Repair of Worn Threading.

about 1½ inches with a hacksaw and driving in a thin piece of metal.

Then heat and pound together to give the original diameter when new. Then re-thread. I have done this on several cars the past year and none have come loose.—F. G. A., N. D.

Handy Way to Fill Batteries.

Take a quart milk bottle and fit it with a cork with two holes through it. Through these holes run short pieces of one-quarter inch copper tube. To each of these tubes fit a piece of rubber tubing—one just long enough to almost reach the bottom of the bottle and the other one as long as you wish.

By placing a finger over the end of the copper tube which has the hose inside the bottle, you can regulate the flow of water as you wish.—W. G. D., Wash.

Ford Front Axle Kink.

If the Ford spindle bolt is not locked with a castellated nut and a cotterpin put in to hold the nut, they work loose. A loose spindle bolt will wear the hole in the axle forks oblong and cut the threads from the lower hole, wearing it to a shapeless condition also.

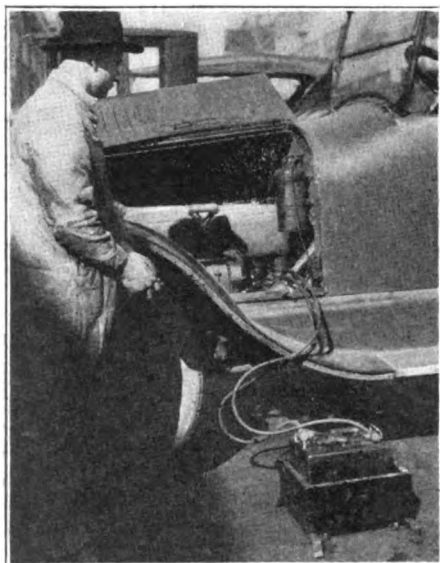
Ream the top of the upper hole and the bottom of the lower hole. Make a cone to fit—a tapered spring bushing, sawed off, will answer, or a spindle body bushing tapered and sawed off can be used.

Slip a bushing cone onto the spindle bolt and insert the bolt in its place. Slip the cone on below and draw them tight into the reamed axle with the nut and lock it. When these bushings are drawn tight enough into the axle, the bolt will not loosen again.—O. A. C., Ohio.

Portable Testing Battery.

The illustration shows a battery that is carried in a small box on casters, which is used for testing starting motors on an automobile when the car's batteries are dead or when they are removed.

When the box containing this battery is



Handy When Testing Starting Motors.

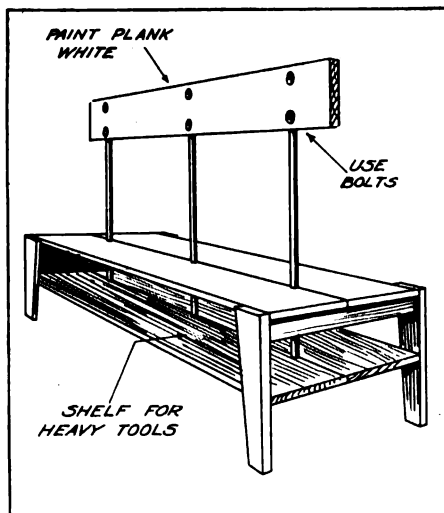
to be moved from one point to another in a garage, the workmen grasp the end wires and pull the truck along behind.—C. W. G., Cal.

* * *

Good Suggestion for a Tool Holder.

Here is a practical shop hint which I know is good. We put a plank 2 ins. by 14 ins. by 14 ft., 3 feet above the center of our work-bench, and painted it white. We then painted a black profile or outline of the different tools—such as gear pullers and special wrenches—on it.

This was done by holding the tool on



Saves Time Spent Looking for Tools.

the board, running a pencil mark around it, and painting in between the lines.

The tools are held in place over their profiles by nails and screws. Some tools had to have holes drilled in them. The

plank is bolted to three upright pieces of 1¼-inch gas pipe, as shown in the illustration. This makes it easy to find the tools and to know where to put them.—A. A. W., Wash.

* * *

Piston Pins on V-Type Engines.

The piston pin bushings on several of the V-type engines seemed to wear excessively. Assuming that the cause was insufficient oil, a groove was cut from end to end of the pin on the upper side of the piston and the pistons replaced. This time the trouble seemed to be cured, so the test was repeated with like success.

Such a groove is now being used on one of the eight-cylinder airplane engines of foreign design, so there seems to be no doubt of its practicability. The groove should not be cut deep enough to weaken the piston so that it will be liable to break, as a small one will carry oil enough to keep the bushings well supplied.—S. E. G., Iowa.

* * *

Starting With Dead Battery Cell.

We were asked to tow in a dead car. Examination showed that the battery had a dead cell. A pair of pliers placed across the cell terminals drew sparks from two cells. The third was dead.

We fastened a wire across this cell from terminal to terminal, which permitted the current from the other two cells to complete its circuit. These two cells generated sufficient current for ignition. We cranked the car and drove it in.—A. C. O., Neb.

* * *

Spoke for Fishing Small Parts.

Nuts and washers are often dropped into parts of a car's mechanism where they are very difficult to reach.

We find that a motorcycle or bicycle spoke makes a fine tool to recover them with. Also when removing the felt washers from the axle housing of a car there is no better tool. It may also be used for pulling out the greasy roller bearings.—R. W. T., Mo.

* * *

Heating in Motor.

We found the motor mechanically perfect, but it would heat abnormally in from three to four miles, driving at the rate of 40 to 45 miles an hour.

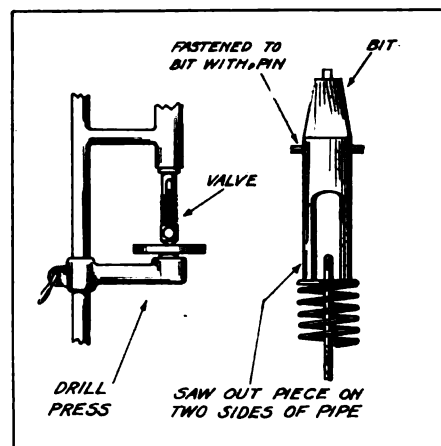
The radiator had leaked and we had anti-leak put in. We installed a new core in the radiator. This did not help, but we found that, by cutting down the air supply to the carburetor with the dash control, and so enriching the mixture, the engine did not heat any more.

This car gets between 14 and 15 miles to the gallon of gasoline—a pretty good mileage for this car. We believe the unusual mileage is obtained as a result of the peculiar carburetor condition which, while it starved the motor and caused it to heat abnormally, got the most power out of the gasoline.—C. A., Neb.

Handy Drill Press Tool.

A drill press, equipped with the tool shown, is handy when removing or replacing overhead valve pins.

The head on the valve cage is set on a table and feed used to compress the spring. The chief advantages of the method are



For Removing Overhead Valve Pins.

that there is no danger from spring, and the ease and speed with which the job may be done.—E. G., Iowa.

* * *

Ford Brake Trouble.

Because the bolts, which hold the Ford brakeshoes in place are not properly tightened, or the nut which locks it is not properly tightened, they often wear the threads from the housing and make the holes oblong.

This permits the shoe to rest constantly on the drum with detestable noises and breakages resulting. To repair, ream the breakshoe sole where it bolts on, large enough to admit a bushing—a spindle body bushing will do.

Shorten the bushing until it will permit the bolt to extend through the hole the same distance as before. Put the brake-shoe and bolt in position and tighten the nut as tight as possible with safety to the threads. Lock the nut with a cotterpin.—C. A. O., Utah.

* * *

Gage for Painting Windshield.

While painting windshield frames it requires great care to keep the glass free from paint.

A piece of tin with a straight edge may be used for a paint gage and will protect the glass. It is slid along the surface of the glass as the painting progresses. One edge is curved up to afford a convenient handhold.—W. T. R., Mo.

* * *

Testing Leaky Cylinders.

When there is a loss of compression, it must be determined whether the valves or piston rings are at fault. By removing the oil breather cap and inserting a piece of hose, one may slowly turn the engine over and keep the end of the hose to the ear. If the rings are leaky, the escaping gas may be clearly heard.—T. W. R., Miss.

Readers' Questions and Answers

Motor Misfires.

I have a Chevrolet car—an old model—that has recently been overhauled but seems to work poorly. The motor appears to misfire at low speed or when throttled down. Also the No. 2 cylinder seems to collect considerable oil.

The spark-plugs are all working O. K. Still, one cylinder seems to misfire. The valves all seat properly and the motor is timed correctly; also the mixture of carbureter seems to be good and adjusted all right.

Could you suggest a reason for this trouble, through the columns of your paper?—E. P. G., N. Y.

Your trouble may be caused by one of the following: Leaking intake manifold, allowing air into the mixture between the carbureter and combustion chamber; improperly fitted piston rings, causing poor compression in one or more cylinders; poor cylinder-head gasket, allowing water from the water jacket of the motor to get into the combustion chamber. Also, one of the piston pins may become loose, causing the cylinder wall to be scored.

We suggest that you examine No. 2 cylinder, or the cylinder that is accumulating oil, for this trouble.

* * *

Arranging Shop Shelves.

We have a small shop but are always having trouble in keeping some of our stock, particularly small parts, screws, etc., properly separated and arranged so that we can get at them quickly when we want them. We have tried a good many ways of arranging our shelving, but so far have not hit upon a plan which has proved satisfactory. Maybe you can give us some ideas that will help. If so, they will certainly be appreciated.—L. M. T., Ill.

The following ideas from a shop seen recently may be helpful to you:

The shop we have in mind was furnished with the usual shelving, which was about 12 inches deep, with sections about every three feet and shelves 12 inches between. There were trays for fixtures and other small parts, with divisions for the various articles.

The owner found the same difficulty in keeping small parts in order as you have mentioned, and finally evolved the following plan, which has proved to be quite satisfactory.

First, he put in extra shelves, so that now he has only six inches between the shelves. Then he put in regular bread tins of the common black kind. These were rather old stock for the hardware man from whom he obtained them so that he got them cheaply. In these bread tins he placed all the broken package goods.

The extra shelving gives him twice the space he had before, as with the 12-inch shelving the shelves were seldom filled to the top.

Then he got from the drygoods store an old pattern case, which will just take a cigar box in the divisions. Into old cigar boxes he put all fixture parts, fastening a sample on the outside. His stock of parts is now properly in shape.

This plan saves much time in getting out material for a job and the shop looks much neater.

For screws, he uses a shelf about 36 inches long, with shelves about four inches apart and eight inches deep. Into this were set "muffin tins" of the deep kind. This made a good place for the many different kinds of small screws, etc. By keeping all larger quantities of screws in small bread tins and cigar boxes—all of which were chained to the front of the shelf by small furnace chain—no boxes can be removed entirely but can be moved far enough to get the screws out.

* * *

Exhaust Gas and Engine Operation.

What effect upon engine operation has exhaust or inert gas which remains in the cylinder at the end of the exhaust stroke?—M. O. R., Pa.

Since internal combustion engines were first used to drive motor cars, designers have sought to increase the power output per unit of piston displacement and to increase the reliability of the engine.

Great progress has been made along these

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

lines, but today it is necessary for the engine to be not only powerful and reliable, but also economical in its fuel consumption. This demand is of recent origin, and knowledge as to the degree in which fuel consumption is influenced by factors of engine performance is meager.

In the early days of the automobile, a favorite topic for discussion was the influence of spent gases which were allowed to remain in the clearance space at the end of the exhaust stroke. This dilution of the fresh charge was considered to have a bad effect, as is evidenced by the number of scavenging devices which were developed.

Most of these devices have been discarded and new methods are being suggested for adding exhaust gas to the induction system, thus increasing the amount of inert gas in the cylinder.

The engineers' attitude seems to have changed from open hostility to toleration and finally to admiration. The first change is easily explained. Increased power was desired and thorough scavenging made this possible by permitting the introduction of a larger charge. The gain in power, however, failed to justify the cost and complication and hence the devices were abandoned.

In adding exhaust gas to the induction system, a higher thermal efficiency has been the goal. Some investigators have found that increasing the amount of inert gas in the charge tends to prevent fuel knock and hence enables a high compression ratio to be employed.

Since thermal efficiency depends upon the expansion ratio, which in the conventional engine equals the compression ratio, it should be higher with a higher compression ratio. Full throttle tests apparently show such to be the case and from these results it has been concluded that the addition of exhaust gas will be even more beneficial at part throttle. It is assumed that under such conditions a decrease of power is of no consequence and that the heat of the exhaust may be of considerable aid in vaporizing the fuel.

Since in service the automobile engine is operated at part throttle most of the time, it is under this condition that economy of fuel consumption is most important. The United States Bureau of Standards has given considerable attention to the effect of admitting exhaust gas under such circumstances.

Nearly all of its investigators have noted that under light loads the engine will not fire mixtures having as high a rate of air to fuel as that which gives the best economy at higher loads. This is probably because the inert gas with partially opened throttle forms so large a proportion of the total charge. The compression pressure is, of course, also too low and many experimenters have ascribed the poor efficiency to this cause.

To prove that the proportion of the exhaust gas is the predominating influence, an engine, partly throttled, was operated

with the leanest air-fuel ratio with which it would fire regularly. The engine was again operated with a sufficient amount of exhaust gas admitted with the charge to reduce the engine power to the same value as had been obtained in the first test by throttling.

Although the pressures in the latter case were considerably higher than before, not nearly as high an air-fuel ratio could be fired and lower thermal efficiency was the result.

"It seems fair to conclude," says the report of the Bureau of Standards, "that the dilution of the charge by the spent gases remaining in the clearance volume makes it impossible at low throttles to employ these air-fuel ratios which, if they could be fired, would yield the maximum efficiency. If the exhaust gas that is present during normal operation forms a barrier to the use of high-efficiency mixtures, then surely the designer ought to avoid any devices for adding still more dead gas to the charge."

* * *

Cylinder Misfires.

I have a 1917 Studebaker car in which I have just had the cylinders rebored and new pistons fitted. Three of the cylinders seem to work all right, but No. 1 cylinder seems to accumulate considerable oil and, after a short time, misfires. Can you advise me regarding the cause of this trouble through the columns of your paper?—G. E. P., N. Y.

Your trouble with the car mentioned is

due, perhaps, to No. 1 cylinder not being properly grounded. There is no doubt that this cylinder has been gouged by the grinding tool, leaving the wall of the cylinder imperfect.

This will allow oil to pass up by the rings and foul the No. 1 spark-plug, giving you the trouble of which you speak.

Perhaps if you would remove the No. 1 piston and install some good make of quick-seating piston ring, you would be able to eliminate the trouble.

* * *

Installing An Ammeter.

As I have been a reader of the AMERICAN GARAGE & AUTO DEALER for some time and have never asked any questions, I now have one and would be very much pleased if you could give me the information.

I would like to know how to connect an ammeter on a 1919 Maxwell car, or will it not be practical to install one on this car. If it can be satisfactorily installed, then please give me a diagram by return mail and oblige.—W. J. D., Wis.

We are publishing, on this page, a diagram of the Simms-Huff system used on the Maxwell car, showing the connections for the ammeter. The ammeter is inserted between terminal A of the lighting switch and the bus bar.

As soon as the voltage reaches a predetermined point, the energy of the shunt winding will cause the cut-out points to close. The charging circuit, shown by the full lines, will then be as follows:

Starting at the + terminal on the mo-

tor generator, follow circuit No. 2 to dynamo+ on the fuse block, from there through the cut-out arm, across the cut-out points, through the series winding of the relay to terminal A on the lighting switch; from there through the ammeter to the bus bar and battery + terminal on the fuse block.

From this point follow circuit No. 6 to terminal No. 6 on starting switch, through the switch contact and No. 10 to No. 10 on storage battery, through storage battery to battery terminal No. 13, to No. 13 on starting switch, through contact No. 14 which is grounded. At the same time, follow circuit No. 6 through permanent connection to No. 12 on starting switch, thence to No. 12 on storage battery, through battery and No. 15 to No. 15 on frame, which is grounded. Grounded connections No. 14 and No. 15 complete the circuit to the motor generator frame.

Current is supplied to lighting circuit (shown by the broken lines) from terminal No. 6 (Bat +) on fuse block, to point H through ammeter to point A on lighting switch, through arms B and E of lighting switch to point F, to lower side of rear fuse, through fuse to terminal No. 8 (Rear), and through cable No. 8 to tail lamp and ground.

An ammeter may be installed on almost any electric system. However, the ammeter must be of sufficient size to carry the amperage of the circuit which is used.

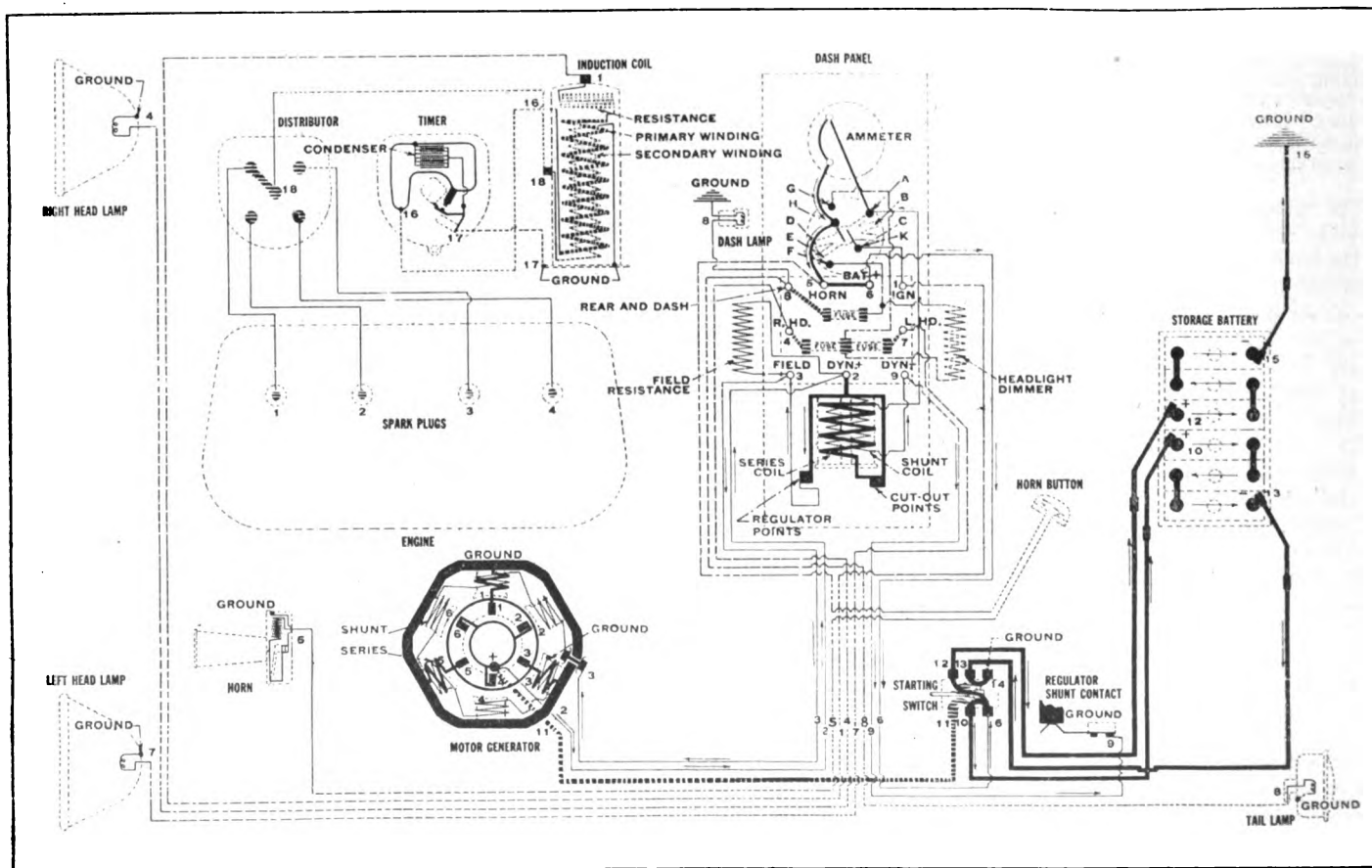


Diagram Showing Installation of Ammeter, Simms-Huff System, for Maxwell Car.

IMPORTANCE OF SUITABLE LUBRICATION.

(Concluded from page 26)

high-speed engines, such as those used in airplanes, require a lubricant with a higher fire test than slow-running engines.

Not long ago the writer listened to a heated argument between a dealer and the owner of a car who, it seems, had melted out two or three bearings and scored his cylinders badly although he had plenty of oil in the crankcase. It appeared that the car had been overhauled at the garage only a short time previous and the owner had filled his case with a red engine oil which he purchased from some oil peddler at a price very much lower than that charged for the oil sold by the dealer.

He was of the opinion the oil purchased was just the same as that for which the dealer was charging him about double—in fact, the peddler told him it was. He purchased a drum of the oil and began using it in his car. The result was that he ruined his engine and wanted to lay the blame at the door of the man who overhauled it.

He was a fast driver and the lubricant did not have a high enough fire test to keep the piston and cylinder lubricated. The dealer was not able to convince this man that the oil was at fault and probably never would have if it had not happened that a chemist chanced to overhear the conversation and offered to test the oil free of charge and settle the argument.

The oil was tested and found to be of a very low grade, both in fire test and viscosity. The owner of the car apologized to the dealer and charged his loss to experience.

Had this man had the proper instructions when he purchased his car, so far as lubrication is concerned, he would have avoided all this unnecessary expense. Many engines are designed to operate at a speed of 2,000 revolutions to the minute and others 2,500 and 3,000. The engine that operates at a speed of 1,000 to 1,500 r. p. m. is considered rather old-fashioned and we see very few of them these days. With the engine running 2,000 revolutions per minute, there are 4,000 strokes of the piston, or each stroke occupies only 0.015 of a second—nearly 1/66th part of a second.

During that time, the whole of the operation necessary to the production of the power stroke must be carried out. This means that the flash can only exist in the cylinder for the fraction of the 1/66th of a second or, in other words, a period so minute that it is hardly possible to imagine its length when we know how difficult it is to count the seconds.

The fact that most cylinders take their lubrication from the crankcase makes it more complicated than one might imagine, as this is what we term "splash lubrication." In nearly every case, the oil is placed in a tank below the shaft and pumped up into the dip pan where it is picked up by the connecting-rods and dashed up under the

pistons. The pistons, in turn, take it up the walls of the cylinders, thus lubricating them.

Just at this time it might be mentioned that the so-called "oil-pumping cylinders" are not what many suppose them to be. The lubricant is whipped up the walls of the cylinder and, when the charge is ignited and the piston starts on its downward stroke, the surplus oil clinging to the walls is driven back with it, preventing the oil from coming into or accumulating in the combustion space of the head.

Should the charge remain unfired for a few revolutions of the shaft, this oil pumps up into the combustion space, fouling the plug sufficiently to prevent it from firing again until cleaned. I have known of cases where oil-pumping cylinders were corrected by correcting the ignition to that particular cylinder. The spark was weak and the charge was not properly ignited, and the oil accumulated in large quantities. Leaky valves will also allow a portion of the compression to escape past the piston, leaving the remaining amount so poorly compressed that it will fail to ignite when the piston has reached the firing position.

In this instance, there would be no explosion to drive the oil back with the piston, and it would be only a very short time until the oil would work its way up to the combustion chamber and foul the plug. In most cases, where the valves are at fault, it can be detected by speeding the engine up immediately after the plugs are clean.

The speed of the engine will increase compression sufficiently to keep the cylinder firing and will continue until the speed of the engine is low enough to allow the charge, or the required amount of it to pass to the crankcase below to prevent ignition.

In the case of the bearings, there is a considerable difference, when it comes to lubrication, from the pistons. The shaft is continually traveling in one direction. Therefore, the point of friction centers more or less at one or two points.

Fig. 1 is intended to show in an understandable way the action of the globules of oil rolling over as they pass away, lubricating the metal surfaces as they move or are forced out from under the load. Should the lubrication be cut off, the two metal surfaces would in a very short time become heated sufficiently to either seize or melt the bearing.

A lubricant that is best adapted for a particular make of car is, in nearly every case, recommended by the maker and when used as per instructions good results are obtained. For it stands to reason that they would not recommend a lubricant that had not been thoroughly tested under every condition that the car would be subjected to after leaving the factory.

We might mention, however, that a splash lubrication system requires a thinner lubricant than a system having a force pump of some type. This is required, for

it is necessary for the shaft to pick the oil up and throw it up into the cylinders to lubricate the cylinder walls, piston-pin bushings, etc.

On the other hand, if the lubricant is too thin, it will not lubricate the pistons and cylinders, although it will lubricate the crankshaft and connecting-rod bearings very well. Therefore, in case the system is of the splash type, it will be necessary to strike a happy medium and select a lubricant that will work for both cylinder and bearings.

Anyone who has made a study of the problem of cylinder lubrication will readily understand that, when the cylinder walls wear, a good and suitable lubricant will at least decrease the amount of leakage past the piston rings. Therefore, as the machine wears from use, it will be well to select a lubricant having more body and a higher fire test.

The higher fire test will be necessary for, when the oil in the crankcase becomes heated, it becomes thin like kerosene. The higher the fire test, the hotter the engine will have to get to thin the lubricant to the consistency of kerosene, and it will not be so easily seared or burned with the gasoline that escapes past the rings at the time the explosion takes place.

It must also be remembered that, when the explosion takes place, the charge—the mixture of gases formed by combustion—has, at the instant of ignition, acquired a very great force and the tendency is to rush past the rings to the case below; there is an opportunity.

It is the wear of the piston rings and cylinder walls that provides that space. This results in two important things to be considered: The tendency is to lessen power, depending on the amount of wear, and to allow the gases to be driven into the lubricant, thus destroying the lubricating properties.

We all agree that lubrication is absolutely necessary; that two metal surfaces must not come in contact with one another without a film of lubricant between them, which must be continually supplied so long as the metal parts are in motion.

Ball and roller bearings have been substituted for the old bearings that were used in some of the early machines. These bearings reduce friction quite materially yet they need lubricating just the same. Instead of the two surfaces that are in contact sliding over each other, one of them turns upon its axis and rolls out of the way. Therefore, the work imposed upon the moving shaft is considerably lessened, so to speak.

In Figs. 2 and 3 we have diagrammatic sketches which will illustrate this fact quite clearly. In Fig. 2 the sketch is intended to show the workings of ball bearings such as those just mentioned. You will note individual balls turning away, and turning around on their own axis as the shaft slides over the surface of the balls.

Fig. 3 is intended to show clearly the

workings of the roller bearings that are in common use—individual rollers turning around on their axis as the shaft which they surround slides past them. It will readily be seen from the sketches why less lubricant is required to handle the same load and also why the friction is reduced over the old style solid bearing.

In the case of the gear wheel shown in Fig. 4, they transmit power, one to the other, by the aid of friction. One particular thing, which is a common law, is that a certain amount of friction between the teeth as they slide over each other is absolutely necessary, or no power can be transmitted. But, on the other hand, the friction must be reduced to the very lowest amount consistent with the certain transmission of the necessary power.

It is a fact that a lubricant can be heavy enough to give rise to friction itself, for the particles of a very heavy lubricant require energy to cause them to move against each other. This may be more clearly brought out by trying to handle a heavy transmission grease in extremely cold weather, or by placing a summer oil in the crankcase of the Ford car in the winter.

The grease requires enough extra energy that starting of the car many times is extremely difficult. If heat is applied to the case of the engine containing the oil the globules will move more easily and the engine can be turned over without difficulty. When the solid is converted into a liquid, the cohesion between the molecules has been so far broken up that there is a fairly free motion among them.

Therefore, this goes to prove that any pressure communicated to any surface of a liquid is transmitted to all parts of the liquid contained. Figs. 5 and 6 are intended to show how this pressure is transmitted in all the different directions in a fluid.

In Fig. 5 the pressure is furnished by a little weight on the sliding tube which fits tightly into the second tube. The lower end of the tube—indicated by the dotted lines—is immersed into the liquid in the drum. In Fig. 6 the pressure is furnished by a piston moving in a cylinder in the ordinary way.

It will be noticed, in each case, that pressure is communicated from the mouth of the tube which in turn extends into the barrel or drum. The molecules of the liquid, if free, will move in all directions. As the temperature of any liquid increases, the free path gradually grows very large, allowing the molecules to move freely.

When the time comes that every user of a motor car makes a study of the lubrication as he should, cars will last longer and repair bills will be reduced to a minimum. Repairmen will have less trouble and the motoring public in general will be many dollars better off each year. If they will just wake up to the fact that lubricants are much cheaper than machinery, the "junk-man" will be cheated out of a lot of business that he is getting at the present time.

WELDING, CUTTING AND BRAZING PRACTICE.

(Concluded from page 24)

it is possible to neglect most of them and still produce a job of welding after a fashion—but it can never be scientifically correct.

In relation to fastening the gas tanks to the wall while in use, a portable truck similar to the one shown in one of the illustrations is probably the most convenient vehicle for the average garage welding shop, since it may be used either as a stationary plant, or taken out on the road to do a break-down job. This truck is easily made by welding angle iron and old pipe in about the form shown. The extra high wheels make it easier to move the loaded truck about the shop. It will be noted that the gas tanks are fastened to the truck by a curved iron rod.

Whenever a tank falls over it means almost certain ruin to regulators and gauges, and it may be the means of severely burning the torch operator by jerking the torch out of his hands. Where for any reason it is not possible to employ the oxygen tank in an upright position, the valve end should be blocked up a foot or so. This inclined position produces practically the same effect as the perpendicular. The incline should be maintained several minutes before starting to use the oxygen.

Sometimes the oxygen tank comes to the welder in a leaky condition, or starts to leak after the valve has been opened once. This is always attended by a hissing noise and the slightest escape can be detected by the ear. If the leak still occurs after closing the valve tightly, about the only thing the operator can do is to attach the regulator and use it to prevent waste of gas, but in this event, the reducing valve should be in good shape.

The tank valve is a very delicate mechanism in spite of its simple appearance, so that unless the welder is an expert in such matters, he had best not try to dismount the whole valve, but send it back to the filler station, plainly labeled "defective." An explanatory note pasted to the tank will be appreciated by the manufacturers.

A leak in the nut of the stuffing box can be repaired in case of dire necessity by shutting off the valve and backing out the nut to insert new packing. Great care must be exercised lest the whole valve be blown out.

In instances where the valve freezes on account of water in the oxygen or that produced by expansion, the welder is expressly cautioned not to attempt to thaw out the ice with the welding flame. Either thaw it with hot water, or allow the tank to stand in a warm room long enough for the ice to melt. Then eject the water as has been described.

We have now about covered the properties of the oxygen drum insofar as the practical everyday welder is concerned. In

the next chapter the acetylene drum will be considered, after which generated acetylene and other elements of the welding process will be taken up.

BOOK REVIEW.

QUESTIONS AND ANSWERS RELATING TO MODERN AUTOMOBILE DESIGN, CONSTRUCTION AND REPAIR, by Victor W. Page. Published by Norman W. Henley Publishing Co., New York, 701 pages, 5½ ins. by 7½ ins., 387 illustrations and plates. Price \$2.50.

Here is a book which every car driver or owner should have on his bookshelf. The inexperienced automobilist will find it invaluable, and even the man with long experience is sure to find it useful.

Arranged in the form of 39 lessons, it seems that there could hardly be a question that can be asked about the construction of an automobile, its parts, driving, repair, or care, that is not asked and answered in simple, concise language.

A few of the subjects covered are: The modern gasoline automobile and its principal parts; fuels for automobile motors; theory of carburetion and its application; types of carbureters and their action; parts of ignition systems and their purposes; batteries, dynamos and magnetos; cooling systems; wheels, rims and tires; the start and control of automobile power plant; utility of brakes and their use; speed changing; chassis troubles and elimination; fixing tire defects; and electric starting systems.

The lesson on methods of lubrication includes, among other splendid illustrations, a chart showing in detail the oiling points of a car and the frequency with which they should be oiled.

Then there's a chapter dealing with road troubles and their remedies. What a boon this will be to the amateur driver—and it is all told in language he can understand.

Another exceedingly useful chart is one which illustrates the complete power generating and transmission system of a motor car, showing the relation of engine, clutch and change of speed gearset.

The lesson on automobile bearings is very complete, the various types of bearings and their care being described in considerable detail.

The illustrations are simply and clearly drawn, and each point is plainly indicated. The wiring diagrams, of which there are a number showing different lighting and ignition systems, are non-technical so that they are easily understood by the non-mechanical reader. These, however, are said to be as accurate as relates to proportion of parts as the best engineering drawings, and all illustrations represent mechanisms which are in daily use.

There are more than 2,000 questions and answers, and this is a book which will be found valuable as a text-book by the instructor as well as being of unusual interest and helpfulness to the automobilist.

Accessories—Dealers' Key to Profits

"It Pays to Advertise" With a Flexlume Oplex Sign!

"Times are bad, very bad," sighed Griggsby, as he slouched lower in his chair.

"Don't I know?" he continued, in the complaining tone which was habitual with him. "Why, I ain't had a customer today—no, and not for several days."

His listener, a somewhat younger and vastly more alert-looking man, noting the slovenly condition of the place and the careless appearance of the owner of the shop, answered somewhat curtly.

"No wonder. You'd drive customers away."

"What do you mean?" belligerently. "There ain't a better-stocked shop in the country than mine."

The younger man laughed.

"Probably it is well-stocked. No reason why it shouldn't be that I can see—but what most of us like is to have a chance to buy new stock.

"Now, see here, Griggsby, all this talk about 'hard times' is rot. There's business and to spare, but you've got to go after it. It isn't going around hunting you—not any more. I could put this place on a paying basis in a mighty short time."

"I'd like to know how," said Griggsby, indignantly.

"Well, first of all, I'd clean the place up. No one wants to come into a place that looks like this does. And, for the love of Moses, man, why don't you put a real sign up there that people can see and so be attracted to your shop? You can hardly make out the lettering on that battered old piece of tin."

"I reckon anyone who wants to can make it out easy enough," answered the other sullenly. "I made that sign myself."

"It looks it," fervently. "Now, see here, Griggsby, you don't want a sign that people have to exert themselves to read in order to find out whether it's advertising a garage or an ice cream parlor. You want something that will make them 'stop, look'—and then come right in and buy. Isn't that so?"

"Well," admitted Griggsby, reluctantly. "that may be so, but it would take more

than a fancy-looking shingle to bring in business these days."

"You hard-headed old pessimist, you! Say, I'd like to show you just what could be done here."

"All right, go on and show me," taunted Griggsby.

"Do you mean it? Are you game to let me run the place a couple of months to prove I'm right?"

"Well," cautiously, "I don't just know

showing that he carried a certain well-known make of tires, standing out on a dark background and effectively placed, caught and held the attention by day or by night.

"Say," said a customer one day, "I've lived in this neighborhood for five years and I've gone downtown for my Kortex tires just because I had no idea until I saw your new sign that I could get them only a few blocks away from my home."

And Hardy was right! At the end of the three months the figures representing the total profits made Griggsby blink.

"The sign was the big drawing card," laughed Hardy. "Of course, a clean, well-kept shop that was prepared to supply their needs held the customers and brought them back again, but that Flexlume Oplex electric sign got them here in the first place."

No matter what line of business you have, there's a Flexlume Oplex sign

that is just right for it. Write the Flexlume Sign Co., Buffalo, N. Y., telling your needs. They will show you what they have to offer for your particular business.

Dearborn Equipment and Hinckley-Myers Co. Issues New Catalog.

Have you seen the new catalog No. 10 just issued by the Dearborn Equipment & Hinckley-Myers Co.? If you have not, you will want a copy, for it covers a completely illustrated and described list of up-to-date garage and shop equipment and tools which offers an excellent opportunity for the installation of new equipment.

This list includes special machines and devices for almost every known operation in connection with the repairing of the Ford car and Fordson tractor, in addition to numerous items that are of universal use.

Machines for cylinder reboring, bearing re-babbiting and burning-in and running-in are shown. The garageman or repairman who places himself in a position to handle these lines of repairwork efficiently is, of course, paving the way to greater financial returns.

Many garages and service stations are



Flexlume Signs Make a Handsome and Effective Appearance—They Cannot Fail to Be Observed.

about that. What's your plan, anyhow, Hardy?"

"Tell you what I'll do," replied Hardy. "You give me the reins here for say three months. I'll run the place on my plan, put it in shape and put a real sign up there, and at the end of three months—if my plan works—you pay for the new sign and give me half the profits I make for you in that time. If the plan doesn't work, you pay me nothing. Is it a go?"

"All right," agreed Griggsby, "but I know you can't do it in these hard times. It's going to be a good lesson for you, though, you young upstart."

The bargain made, Hardy set to work at once. In a week the place was in "apple-pie" order, and the really well-chosen and complete stock was attractively and neatly displayed on the shelves and counters.

But the crowning glory was the handsome electric sign which made Griggsby's garage stand out like a sore thumb. Hardy had a naturally keen advertising instinct, and that sign soon had people doing just what he had predicted they would do—they stopped, looked, and came in to buy.

The raised snow-white letters of the owner's name, in conjunction with wording

taking advantage of the present low level of prices to complete and renew shop equipment. Better get your copy of this attractive new catalog now. It will be forwarded to you promptly, upon request, by the Dearborn Equipment & Hinckley-Myers Co., 1503 Tower Bldg., Chicago.

For Ignition Trouble—The Chief Timer and Wire Assembly.

For Ford cars, trucks and Fordson tractors, the Chief Products Co., 2335 South Michigan Ave., Chicago, is offering a solution for ignition trouble in the Chief timer cover and wire assembly.

The "Chief" is designed to protect the timer wires from oil, water and dirt and to prevent short circuits, the full current being delivered direct to the plugs without loss.

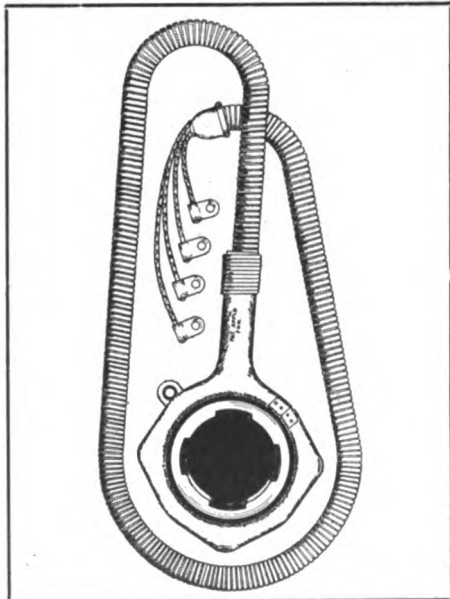
It will fit all standard shape timers for Ford motors and will last indefinitely regardless of the number of timers replaced on the motor, it is said.

The Chief timer cover is made of a flexible insulating material that will conform to the shape of all timers that are approximately three inches in diameter and circular in form, and is oil and waterproof.

The complete assembly consists of the timer cover, four wires of 110-volt new code lamp cord, incased in a flexible metal conduit right up to the coil box, and can be used overhead or in any position desired.

The installation is simple and can be made by anyone in a few minutes.

In addition to the Chief timer cover and wire assembly, this company is market-



The "Chief" Protects Timer Wires.

ing the Chief oil gage for Ford cars. A real boon to the Ford owner, the Chief oil gage is simple, convenient and accurate and, it is claimed, will prevent burnt bearings; prevent carbon in cylinders; oily spark-plugs due to too much oil; and eliminate the necessity of getting under the car to determine the oil supply.

The Chief oil gage is made of the best materials throughout, and consists of an especially designed elbow, a tube and a gage indicator, permanently attached to the Ford motor. The special elbow replaces the lower petcock, the original petcock being then replaced in the elbow and so not changing the regular Ford principle. The tube screws into the elbow and projects about one-half inch through the splash pan $9\frac{1}{2}$ inches above the front end of the right running board. The gage indicator is inserted in the tube.

Further particulars concerning these excellent devices may be obtained by writing to the Chief Products Co., 2335 Michigan Ave., Chicago.

New Timer Makes Record for Endurance and Reliable Ignition.

The Leich Electric Co., Genoa, Ill., manufacturers of telephones and other electrical apparatus and, in particular, the Radd spark-plug, has now ready for the market a new timer for Ford cars known as the Leich magnetic timer.

The Radd spark-plug being a plug that embodies the well known principle of a third electrode, thereby producing a better ionization of the gas which in turn aids the discharge of the main spark gap, has the last few years, caused the Leich Electric Co. to spend considerable time and research work on automobile ignition.

The possibility of a timer for Ford cars that contained new and desirable features became apparent. The roller type was not considered, due to the fact that the timer is required to operate on the low-voltage side of the ignition system, and experience has shown that a roller will not make a reliable contact in a circuit when low electric pressure is used.

A wipe contact employing flat springs seemed to be the only plausible method. The question of wear of the springs was then to be considered. A spring contact with a rotating part of the commutator type was put on test and soon showed that the insulation of the rotor wore the spring contact and would also carry a film of oil and dust clear around the insulation, making the surface a conductor which was objectionable.

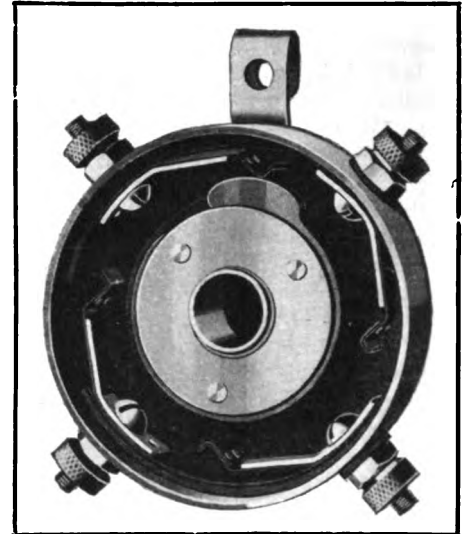
A flat spring, with a heavier piece of hard spring material attached to the end where it comes in contact with the rotor, was the most promising. This spring also had to be supplied with a fixed stop piece against which the spring would rest in its normal position.

In order to reduce the wear, it was found necessary to have the spring wipe only that portion of the rotor required to make the electrical contact and in its normal state not to come in contact with the insulation of the rotor.

The difficulty here encountered was that when a high portion of the rotor struck

the spring, it would flip the spring away and not make contact of a sufficient length of time for proper ignition. It was then decided to make the contact portion of the rotor the pole pieces of a two-pole permanent magnet.

The magnetic attraction of the spring to the pole pieces of the permanent mag-



Long Life and Contact-Making Qualities Features.

net held the springs in contact over the entire surface of the pole pieces which at the same time constituted the contact element of the rotor. It was soon found in practice that a liberal amount of grease placed in the cup when installing the timer had no effect on the contact-making qualities and by so doing easy and satisfactory lubrication was at once provided for.

The Leich timer, developed along the lines mentioned, proved so satisfactory on test for both long life and contact-making qualities, that it was decided by the manufacturer to place it on the market at once.

The advantages claimed by the manufacturer are as follows:

A rotating contact-making device that has no hinged or spring suspended parts, thereby eliminating the interference with its proper functioning by engine vibration or jarring of the car.

Light wiper springs, with heavier ends supported by a fixed stop piece coming into contact with the rotor only during the short period during which the circuit is to be closed.

Insulating materials impervious to moisture and grease used in its construction.

Uniform and perfect electrical contact assured at all speeds, due to the magnetic attraction of the spring by the pole pieces of a permanent magnet which constitutes the contact surface of the rotor.

No interference with the proper electrical contact between the springs and rotor by oil or grease used as a lubricant.

Wear reduced to a minimum.

Non-breakable springs.

Satisfaction.



"The Eyes Have It!"

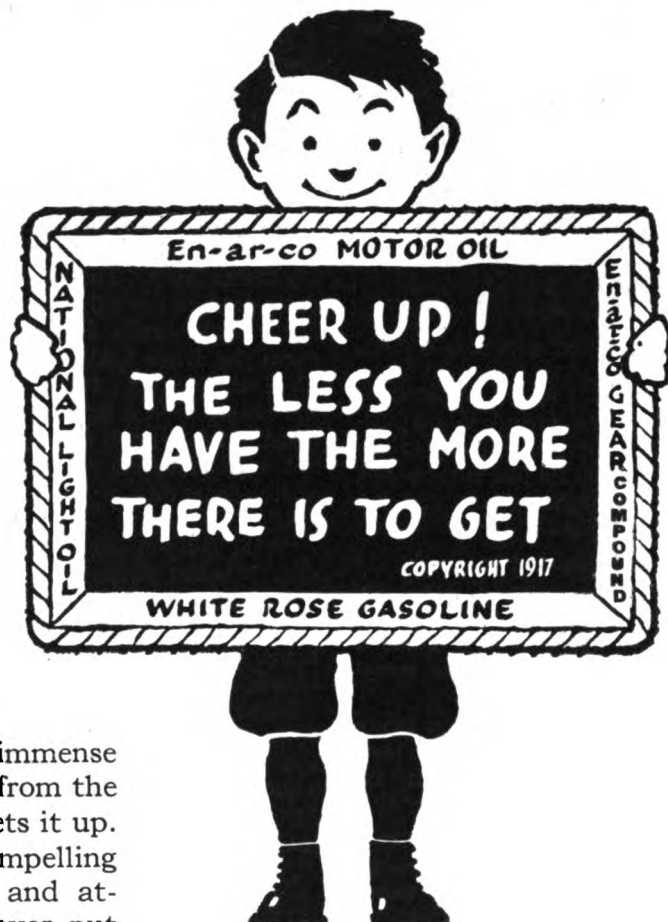
The Boy and Slate Sign Gets the Eye—Makes Sales

ALL eyes are on this immense Boy and Slate sign from the moment the dealer sets it up. It is the greatest attention-compelling novelty—the most unusual and attractive advertising device ever put out.

The size of it (over six feet high) won't permit of a passer by, on foot or otherwise, getting by without seeing it. It is made so that "those who run may read." Every other day you chalk in a new saying on the big slate. We supply you with enough of these sayings to last a year. These epigrams, or sayings, are snappy, clever and funny. This keeps people looking for them; it keeps the sign new; it gives you and your business a progressive, up-to-the-minute character.

This kind of advertising attracts people to you and makes sales for you. It's the kind of advertising that stays and pays.

The Boy is over six feet high—painted in brilliant colors, cut out all around and mounted on frame work so that you can stand him where he will get the most attention. It's a winner.



How to Get This Sign

Write to us for our offer and full particulars about the "Boy and Slate" service, and for prices and other selling helps on En-ar-co Motor Oil, En-ar-co Gear Compound and other En-ar-co brands. Remember we furnish the sign and enough slogans for the entire year. Get this offer—use the coupon.

The National Refining Co.

NATIONAL HEADQUARTERS

G-731 National Building, Cleveland, O.

4 Modern Refineries 92 Branch Offices

THE NATIONAL REFINING COMPANY

G-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

I now sell.....oil.

"Stop!" Warns the Meile Signal. It Never Forgets.

It had been a trying day for Burns, and the annoying little creaking noise somewhere about his car did not tend to soothe the irritability that the difficulties of the day had aroused. There was nothing for it. He might as well stop at the garage now and have the car looked over, he thought.

At the garage, the difficulty was soon lo-



Automatic Signal Which Aids Safe Driving.

cated and remedied. As he finished his work, the garageman turned to his customer saying: "I have something in the way of a safety signal I'd like to show you, Mr. Burns. You ought to have one for your car, too. Let me—"

But he was not allowed to finish. "I have no time to be bothered now," exclaimed Burns. "Besides I don't want my car looking like a junkshop, as it would if I allowed you fellows to sell me everything you want to sell me."

Warned by the impatience of his customer, the garageman wisely refrained from further comment, and Burns left the garage.

It is one of the peculiarities of accidents that no one can ever tell just exactly how or why they happen. A few blocks from the garage, as Burns slowed down his car preparatory to stopping, a car back of him—the actual nearness of which his pre-occupation had perhaps caused him to gauge inaccurately—crashed into the rear of his car with considerable force, entailing some damage to both cars.

"If you must go to sleep when you're driving, you might at least carry a signal on your car," was the sarcastic remark of the other driver as they examined the results of the collision.

In spite of his indignation, Burns realized that he was more than half right, and the memory of the garageman's suggestion flashed back to his mind. So, instead of the cutting reply his first impulse directed, he answered calmly: "I suspect you are right. Evidently I do need something. Have you such a signal on your car?"

"You bet I have," replied the other. "And I wouldn't be without it. Would you like to see it?"

"I certainly should," answered Burns, so they walked around to the rear of the car where Burns was shown a very convenient and efficient automatic safety signal.

"All you have to do," said the owner, "is put it on and forget it. You have both hands free to handle the car, and the Meile never fails to give the signal, either day or night."

"As you see, I have attached this to the rear of my car, but you can have one for the front as well if you wish. There's another thing, too, and that is that it acts as a tail-light at night, throwing a strong light over the license number."

"Even if your battery should become discharged to such an extent that it will no longer turn the starter, it is still strong enough to operate this signal, as only one ampere of electricity is required to operate it."

"Say you are planning to stop your car—as just now—when the speedometer registers 15 miles per hour the signal automatically flashes 'Slow.' This shows until the car slows down to five miles per hour, then the signal automatically flashes 'Stop!' This warns the driver behind you without any effort on your part. If you intend to turn, you simply push a button on the steering wheel. This instantly flashes your intention to the driver behind you and to the traffic officer, pedestrian or vehicle approaching you."

"What did you say is the name of the signal?" asked Burns.

"The Meile," answered the other. "It is made by The Meile Mfg. Co., E. St. Louis, Ill. The Wilkins garage around on Eighth street carries them."

Burns grinned. "Maybe that's the thing he was trying to sell me a few minutes ago when I stopped there, but I thought I hadn't time to listen to him then. Guess I'll surprise him by dropping in again and having him install one for me."

And he did.

Handy Reference Books for the Garage Man or Repair Man.

If you are looking for a convenient, pocket-size edition of an automotive reference book, you cannot do better than ask Frederick J Drake & Co., 1019 S. Mich. Ave., to send their 1921 book list.

This list is very complete, including practical mechanical books, foreign language books, general reference books, and popular handbooks of various kinds. Of particular interest to the garageman or repairshop man are the books on automobiles, electricity, shop practice and welding.

For instance, there will be found in this list the following: "Electric Motor Control Systems and Methods," by Horstmann and Tousley; "Alternating Current Theory, Practice and Diagrams," by Horstmann and Tousley; "Wiring Diagrams and Descriptions," by Horstmann and Tousley; "Up-to-Date Electro-Plating Handbook," by J. H. Weston; "Storage Batteries," by J. T. Niblett, M. I. E. E.; "Brookes' Automobile Handbook," by I. E. Brookes; "Automobile Ignition," by Harold P. Manly; "The Ford Motor Car and Truck—Fordson Tractor," by Harold P. Manly; "Starting and Lighting Troubles, Remedies and Repairs," by Harold P. Manly; "Tires and Vulcanizing," by Henry H. Tufford; and many other equally practical and helpful volumes.

These books are all fully illustrated, and bound in either cloth or leatherette, and are being offered at attractive prices.

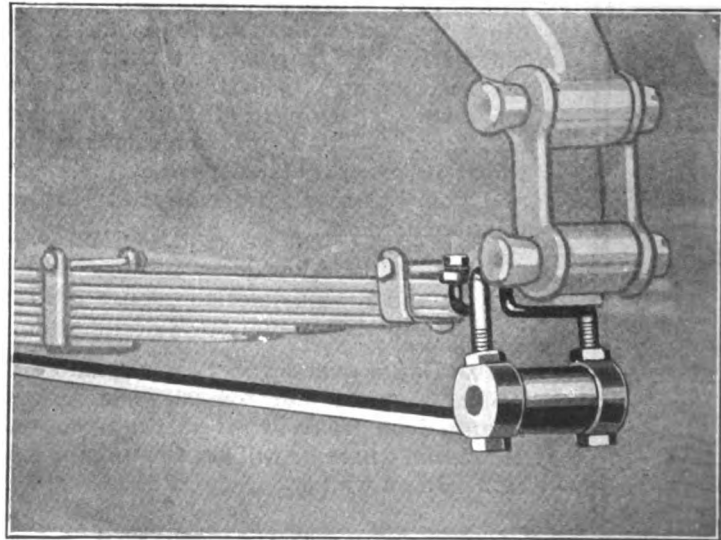
Make Car as Easy-Riding When Unloaded as When Loaded.

It is a well known fact that springs which are designed to carry a certain load act more efficiently when carrying a full load than when under the burden of a partial load.

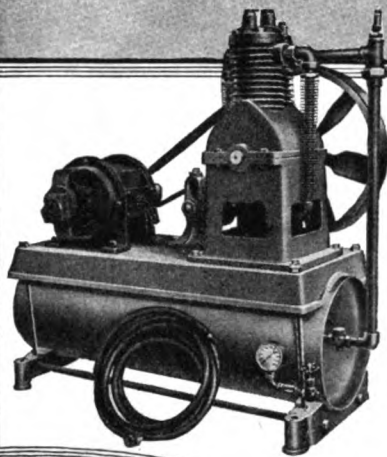
The object of the Brobst equalizers, now being marketed by the DeMund Sales & Service Co., Indianapolis, Ind., is to provide a means for absorbing or cushioning the recoil of motor car springs.

The advantages claimed for the Brobst equalizers are that: They equalize all shocks to the motor car, making the car ride the same when unloaded as when loaded; they cushion the recoil of the springs, and prevent breaking of springs; they minimize the side-sway; they increase tire life as even road contact is produced; they greatly increase the efficiency of the springs; and they are offered at an unusually attractive price.

Dealers and others interested may obtain further details by writing the DeMund Sales & Service Co., 1110 North Meridian St., Indianapolis, Ind.



Equalize All Shocks to the Motor Car, Absorbing Recoil of Springs.



CURTIS TWO-STAGE AIR COMPRESSORS

An Original Design

Curtis Two-Stage Compressors embody every good feature of single-stage plus two-stage efficiency. Have all the exclusive features that established our single-stage so firmly on the market—and in addition have all possible advantages of two-stage compression.

Aeroplane type COPPER inter-cooler with thin copper radiating fins rigidly attached, assuring most efficient cooling and fullest advantage of two-stage compression. Built in several styles in two capacities. Ask your jobber. Insist on a Curtis. Rather than accept a substitute, write us direct.

Curtis Pneumatic Machinery Co.

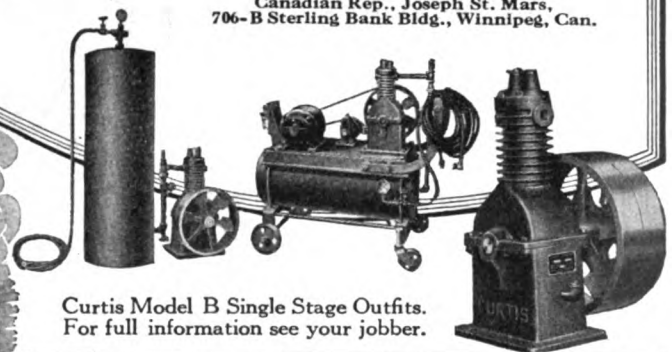
1515 Kienlen Ave.

St. Louis, Mo.

Branch Office:

530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.

Every Feature of W&C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

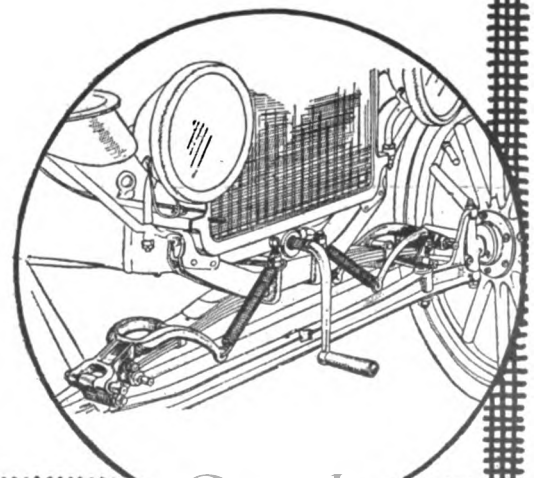
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



Hayes Wheel Company Brings Out Demountable Wire Wheel.

Some time ago, the Hayes Wheel Co., Jackson, Mich., brought out a new demountable wire wheel. It was tried out quietly and, now that approximately 3,600 sets are in use, and due to the fact that the users have found the new wheel entirely satisfactory, the company has given out details.

The new Hayes product is called the "Hayes - demountable - at - the - rim" wire wheel. It is said to be much different in construction from the old style wire wheel, in that the company has applied to its construction the same principles which have made a success of its new wooden wheel.

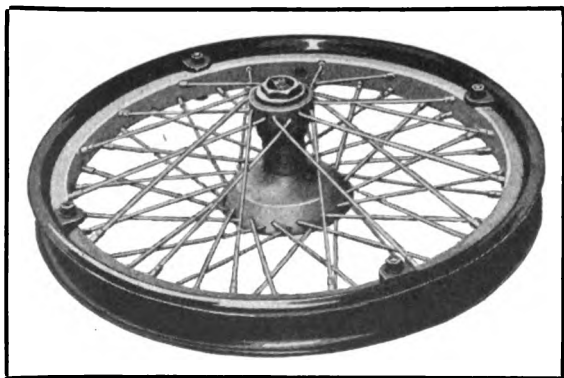
Some time ago, the Hayes company perfected a wooden wheel with a steel felloe, which construction completely eliminated the loose wedge, using, instead, fixed lugs, securely fastened to the rim. This type of wooden wheel proved so successful, it is said, that it has been adopted by several of the largest producers of motor cars.

Now, Hayes engineers have applied the "fixed-lug" construction to wire wheels, with the same success. The same kind of steel felloe is used, and the same kind of demountable rim. In fact, the new Hayes wooden-wheel rims are perfectly interchangeable with the new wire-wheel rims.

The attached lugs on the wire wheels entirely do away with loosening the spokes or throwing the wheel out of round. These make this type of wire wheel possible and perfectly successful in everyday, practical use, the manufacturer asserts. The construction is fully protected by patents.

A set of the new wire wheels consists of four. The extra, or fifth, required in a set of the old type wheels, is not needed any more than with a set of wooden wheels, it is said.

The following exclusive features are



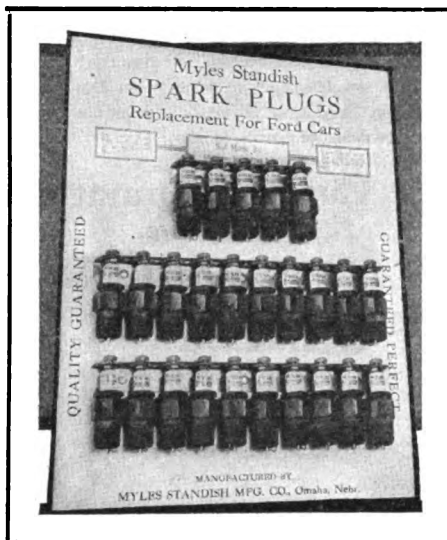
New Hayes Demountable Wire Wheel.

claimed by the Hayes company for its new product: In mounting the rim, the full pulling power of lug bolt can be exerted in drawing the rim to the felloe; only one-half the number of bolts otherwise required are, therefore, needed; each lug bolt, also, becomes a driver, preventing even

the slightest slippage of the rim; there are no loose lugs and misalignment of rims is impossible, which means longer life for tires.

A Novel Display Which Boosts Spark-Plug Sales.

The Myles Standish Mfg. Co., Omaha, Neb., manufacturer of Myles Standish spark-plugs and cores, has originated a display that is proving immensely popular



Boost Sales With Novel Spark-Plug Display.

among dealers. The rapid increase in sales has been even greater than was expected. Many dealers say it's the best idea they have seen in the spark-plug line.

The display consists of a stiff, substantial board $\frac{3}{4}$ -inch thick, with a strong easel. One board is for plugs, the other for cores. The plugs and cores are mounted on strong brass angles, and can be detached in an instant. Myles Standish spark-plugs and cores are sold on boards. As soon as a board is sold out, it is thrown away and a new one put up. The dealer not only gets quicker, easier sales but he gets a longer margin of profit as well.

Display boards have always been one of the dealer's biggest sales helps. Put an article where it gets attention and it sells rapidly. The Myles Standish Mfg. Co., however, is said to be the first to apply this idea to the sale of spark-plugs and cores.

This display marks a new departure in the retailing of spark-plugs and cores. Heretofore they have always been packed in cartons and allowed to lie around, on or under the dealer's shelves, out of sight and out of mind.

This new display puts them on top of the counter, where they stand out so prominently that every customer who comes into the store sees them and is attracted. As a result, many sales are made to customers who come in to buy other accessories.

A Union Tool Chest Prevents Loss or Theft of Tools.

The Union Tool Chest Co., said to be the largest manufacturer of tool chests in the world, is just putting on the market 25 new styles and sizes of zinc-covered tool chests, among them many exactly suited to the requirements of car owners and garage mechanics.

The devotion of some time to a study of what the man who owns a car or whose occupation is repairing cars requires in the way of a strong, durable and handy tool chest, has resulted in a product which will be of great interest to automotive mechanics. All who wish to keep their tools safe from theft, fire, rust or loss will be interested in these new Union tool chests.

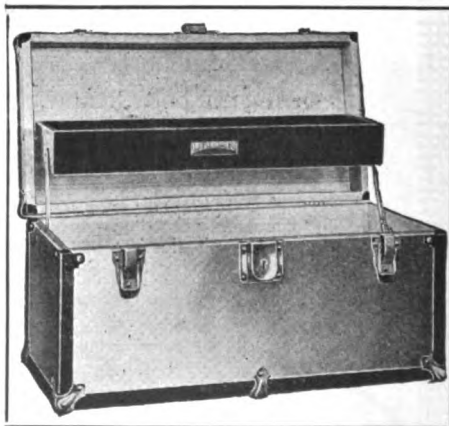
These new chests, it is claimed, are unexcelled for convenience, being made with a tray that automatically raises with the top and always remains level and out of the way. They can be furnished without trays if desired, to accommodate large tools, such as blowtorches, etc., and for mechanics who prefer to make special trays to exactly fit their needs.

Anyone who is mechanically inclined will appreciate the mechanical superiority of these chests. It is said that government tests have proved the lock corner used to be the strongest corner joint known. Only the best of lumber is used, and the zinc covering is of the best quality lacquered zinc, carefully formed over the edges and properly attached. It will not rust or corrode.

The handle is made of genuine leather, and all corners, catches, clamps and locks are brass-plated and of lacquered steel, securely riveted on. Each chest is furnished with a special Corbin 12-change lock.

The style illustrated is $7\frac{1}{4}$ inches by 8 inches inside, and is made in seven different lengths from 13 inches to 32 inches. A similar style is also made in a smaller chest.

These chests are unconditionally guaran-



Tool Chest Unexcelled for Convenience.

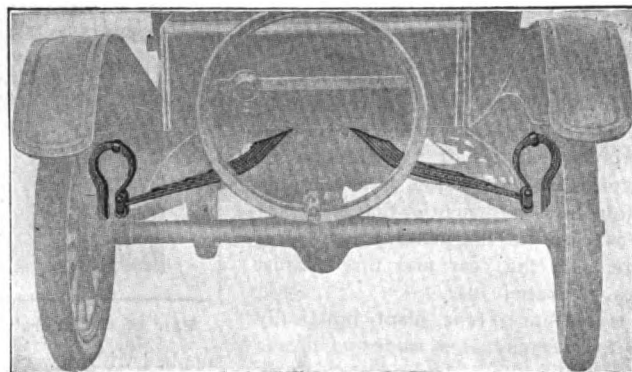
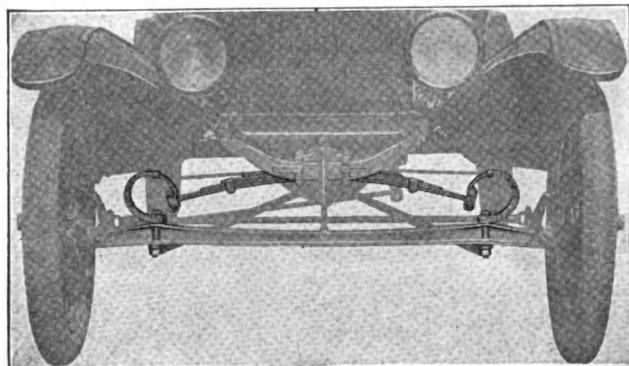
teed to give absolute satisfaction. They are of high quality, both in materials and construction.

Write the Union Tool Chest Co., 67 Mill St., Rochester, N. Y., for details.

Grey Goose

(Patent Applied for)

"Makes a feather-bed"



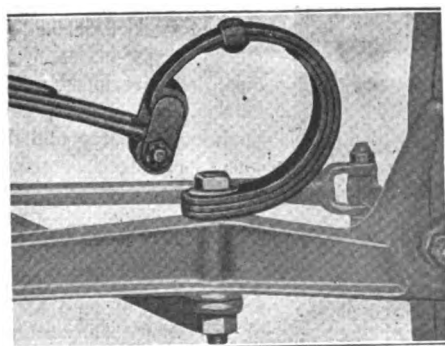
\$10⁰⁰
SET of 4

WANTED: Salesmen - Distributors

with Ford Car *on Exclusive Basis*

We believe the GREY GOOSE to be the easiest riding and most satisfactory shock absorber of all time. Sweet and smooth in action, simple in construction, easily applied, and highly satisfactory in service. They are taking like wildfire wherever shown.

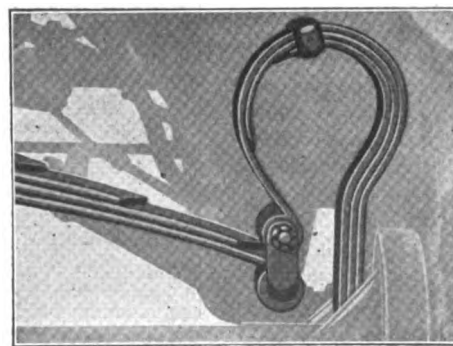
We are appointing exclusive dealers and distributors in select territory, and if the territory that you desire is not taken, you should act immediately to obtain the fastest selling accessory of the age. We are glad to submit our proposition in detail immediately.



INDIANA PARTS CO.

Manufacturers of ECLIPSE
Vizors, Shock Absorbers,
Live Ford Specialties

Dept. A A
RICHMOND,
INDIANA



Here and There in the Motor World

Reynolds Spring Co. Constructing New Building.

Three interesting announcements have just been made by the Reynolds Spring Co., of Jackson, Mich.

One is that it is now constructing a splendid new two-story building, the first floor of which is to be devoted to manufacturing and the second to be used for offices and a cafeteria for office help and employees. It is expected that the new building will be ready for occupancy by December 1.

In addition, a trackless trolley system between the Otsego and the Water street plants for the service of the employees of the factories in that section, is being built.

The third announcement is that the company's business for the month of July was the largest of the year and that August promises to exceed July.

The extension of the plant practically doubles the capacity, it is said, and means a great simplification of activities. It is contemplated that the present force of over 600 men will in time be increased to 1,200 and the company has contracts under way which will call for still further additions to the manufacturing capacity of the plant.

Some Boy! Six Feet Tall and Does a Man's Work!

Traveling about the country is a very remarkable boy. This boy is over six feet tall, and he is handling a man-size job—and that at a yearly salary that is probably no more than most business men are paying their office boys weekly!

He is always cheerful, always smiling, and always ready with a witty saying that creates comments and smiles among customers—and prospective customers—as well as helping to increase sales.

This boy is the justly famous boy of the Boy and Slate Sign and Epigram Service which is proving so popular among dealers everywhere. At the very "top of the world"—the most northern post of the Hudson Bay Companies, at the mouth of the McKenzie River on the Arctic Ocean—are two of the Boy and Slate signs.

Because of its great size, its interesting sayings, and its four attractive colors, the Boy and Slate sign always makes a hit with the public.

The "boy" and his message make people smile, creating a receptive mood and paving the way to increased business. Dealers using this sign are kept



A Pair of "Winners" From Eskridge, Kans.

supplied with new copy for use on the sign.

Here are a few samples of the wit and "humanness" of the boy:

Crookedness never pays—look at the corkscrews out of jobs.

Some are fast—Many stuck fast—Few steadfast.

Envy the bird—only one bill to take care of.

The man of the hour never wastes a minute.

Little En-Ar-Co

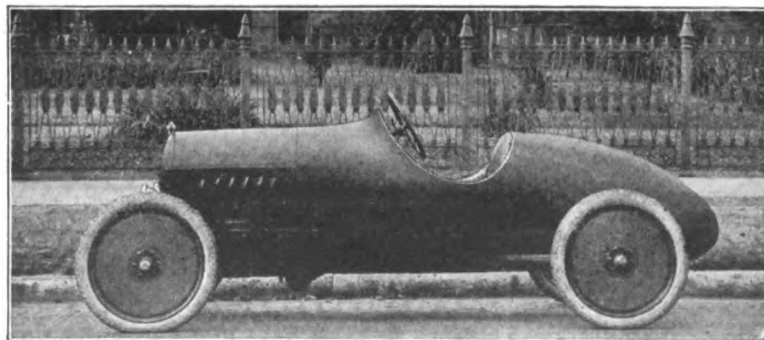
Little White Rose

Will make a Big-Car-Go.

Many and varied are the clever epigrams supplied for these signs. Their author, Chas. L. Archbold, of the National Refining Co., Cleveland, Ohio, seems unlimited in his ability to find an epigram in everything he sees.

Prohibition, the newspapers' daily toll of deaths and accidents, people seen on the streets, fads of the day, holidays—anything and everything, in fact, furnish ideas for his witty sayings.

If you would like to have the Boy work for you, just write the National Refining Co., Cleveland, Ohio, for further details.



Built of Highest Quality Steel Metal New Ford Speedster Body is Strong and Handsome.

New Ford Speedster Body Designed by Race-Way Body Co.

The Race-Way Body Co., of Indianapolis, Ind., is building and marketing a racing body for Ford cars. The body is built of highest quality, No. 20 gage, polished steel metal throughout. A standard Ford gasoline tank fits into the tail compartment and is easily filled by pulling the seat forward. The tail compartment is floored with metal, making additional room for tools and luggage.

The radiator shell fits the core perfectly without the use of a wire screen, as is usual in bodies of this type. The seat and back are fully stuffed and covered with high-grade imitation leather. There is ample room in the seat for two persons to sit comfortably and the passengers have plenty of leg room.

The bodies are primed with medium brown color. The Race-Way Body Co. has been in production for some months and is able to make deliveries as soon as orders are received. The bodies are sold on a guarantee to be as represented or money refunded. Prices are based on pre-war levels.

J. R. Craig is president of the Race-Way Body Co., which also markets underslung parts, disks for wheels, and other Ford racing accessories.

Greenfield Tap and Die Issues New Small Tool Catalog.

The Greenfield Tap & Die Corp., Greenfield, Mass., is now distributing a new and most comprehensive catalog describing the small tools and pipe tools which comprise the greater part of their product.

From the frontispiece, depicting the plants of this largest manufacturer of small tools in the world, to the seventy or more pages of tables and useful information at the back of the book, this catalog contains a great deal that is of interest to the user and designer of tools and machinery. Some of

Here are a few samples of the never failing wit and "humanness" of the boy: tative, making it valuable for reference.

The tools described include screw-plates, taps, dies, drills, reamers, milling cutters, bits, arbors, countersinks, hobs, tap and drill kits, mandrels, sleeves, sockets, stocks, tap wrenches, pipe vises and pipe wrenches.

The Greenfield Tap & Die Corp. will send a copy of this book to any address upon request.

FEDERAL ELECTRIC SIGN

How Do Automobilists Know Your Garage at Night?



It is easy enough for them to find you if you have a Federal Electric Sign—an inexpensive form of advertising that really brings results. You can't afford to be without one, for you are losing prospective customers who pass you by without seeing your garage and patronize one that has a Federal Electric Sign lighting up the front. It instantly tells the automobile owner that he can have his wants supplied, and accordingly he will go direct to the garage that advertises for his patronage.

Made of porcelain enameled steel—will not rot, rust or fade and will last indefinitely. Costs but a few cents a day for electricity.

Gain a step on your competitor. Make a bid for the patronage that passes you by when your garage is dark at night. Get a sparkling electric sign. Send coupon today for full details, prices and **free sketch** showing how your sign will look.



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

If you have no electricity in your town, you must continue to fold up your business at night

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information **price and free sketch** of a Porcelain-enameled Steel Sign for my business. Explain your 12-months-to-pay Plan.

Name City..... State.....

Street and No..... Business

Store Frontage..... No. of Floors.....

AGAD-9

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

Up-to-the-Minute Garage Equipment

Used Crankcase Oil Can Be Re-newed Economically.

Everyone recognizes the name of S. F. Bowser & Co., Inc., of Fort Wayne, Ind., as that of a pioneer among the oil pump and tank manufacturing companies of the world.

It is not surprising, then, that this company, which early saw the possibilities of an equipment for the reclaiming of used motor oils, is now placing on the market an oil-reclaiming outfit, which it believes will revolutionize the handling of crankcase motor oil.

Its field, of course, is unlimited, but lies primarily in the following lines: Garages, industrial plants operating motor trucks and commercial vehicles, fleet truck operators, taxicab concerns, oil companies, etc.

To the garageman and the repairman this equipment opens up an entirely new field for profits and opportunities of rendering service to motorists which offer almost unlimited possibilities for increased business.

The ability to reclaim the used crankcase oil makes it commercially profitable and feasible for the garageman to refill motors with fresh oil at a much lower price than is possible under present practices.

They can collect the used oil drained from crankcases, reclaim it and use it over and over again. This practice will encourage the motorist to change his oil more frequently, the direct result of which will be better mileage, less motor trouble and better all-around motor-ing satisfaction.

With the heavier motor fuels now being consumed, the oil in the crankcases becomes diluted with the heavy, unburned end of the fuel. This dilution not only reduces the viscosity of the oil to such an extent that it is no longer a lubricant, but by reason of the dilution there is a loss of power due to the increasing friction and a loss of compression. Also, the wear on the engine is increased.

In fact, one automobile manufacturer makes the statement that if automobile engines were properly lubricated—oil

of proper viscosity used and changed frequently—the life of the engine would be doubled. Naturally, motorists find this impracticable because of the cost of supplying new oil at each change.

Therefore, the new Bowser oil-reclaiming outfit offers the opportunity to garages and service stations to open up a highly profitable department by installing one of the reclaimer systems to reclaim the used crankcase oil which heretofore has been thrown away. A regular service of changing oil for motorists, with a reasonable allowance by measure for used oil, would surely meet an increasing demand. This used oil, it is claimed, can be restored to its original lubricating value and will find a ready sale at a good price.

An interesting test was made recently by a person wholly disinterested in the sale or marketing of this product. A motor having a clean crankcase oil was placed on the block and run for a period of 65 hours without stopping. It was then torn down, and the cylinders measured, with most accurate measuring equipment known. There was no detectable wear.

The same motor was reassembled and dirty crankcase oil used and run for a period of 65 hours. It was again torn down, and the cylinders measured, with the result that the recording instruments showed a wear of .005 of an inch. This test tells its own story.

In the reclamation of used oil, two sepa-

rate operations are necessary in order to restore original viscosity, fire and flash-point—the dilution must be eliminated and all harmful solid foreign matter in the oil must be removed. The two operations, it is said, are performed very satisfactorily by the Bowser oil-reclaiming outfit.

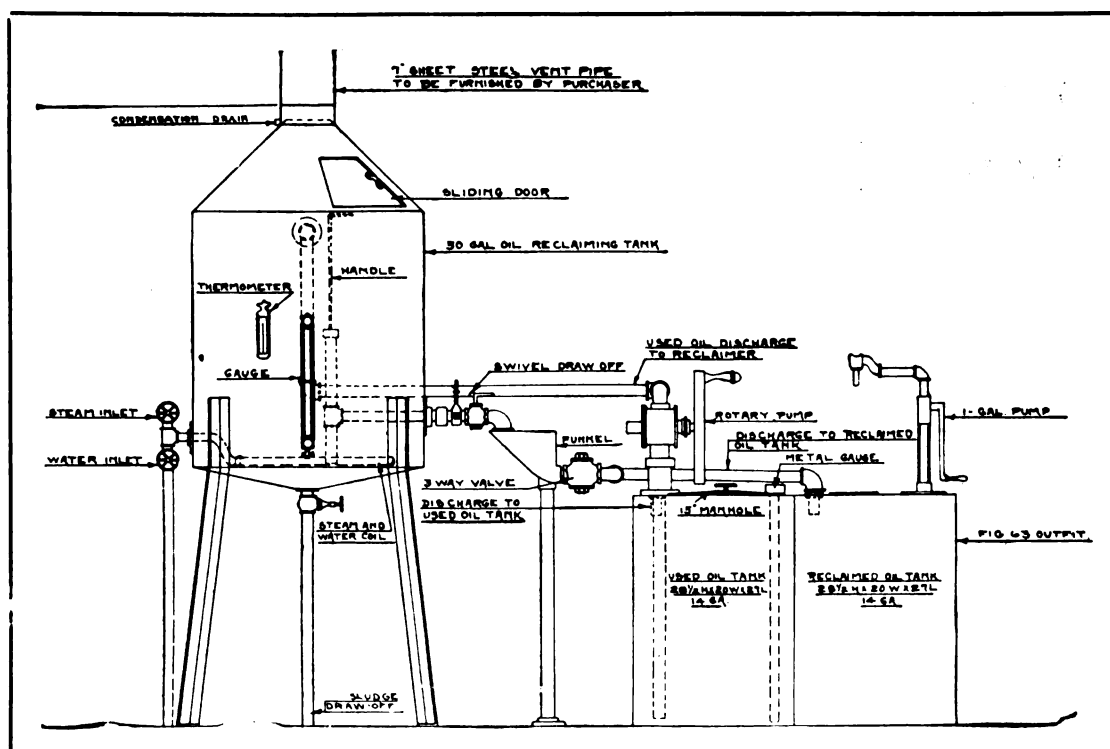
The gasoline is driven out of the oil by the action of the steam, operating on the same principle as in a still. The other foreign matter is removed by precipitation—a coagulant being added to hasten precipitation. The coagulant used is a very common chemical and can be procured in any locality at a cost of approximately $\frac{1}{2}$ cent per gallon of oil reclaimed. The total cost of operating the reclaimer, including labor and steam, will be approximately 5 cents per gallon.

The outfit shown in the illustration is the Figure 350 oil reclaimer and is manufactured in two sizes—50 and 100-gallon capacity per 24 hours.

For specifications and further details concerning this outfit, write to S. F. Bowser & Co., Inc., Fort Wayne, Ind., who will gladly furnish any information desired.

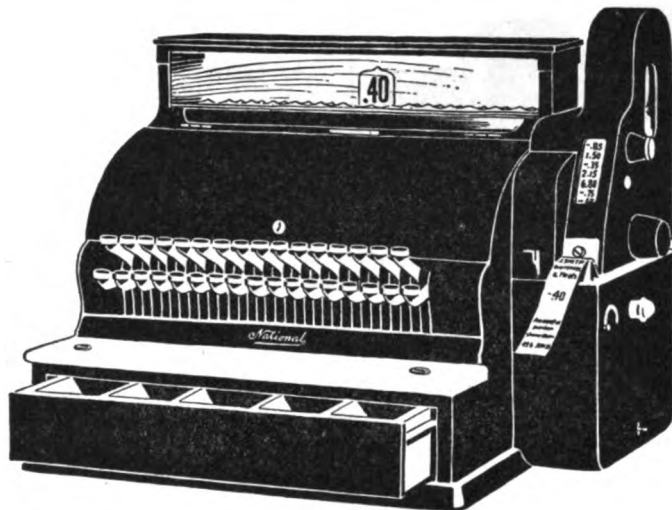
Ford Triple Gear Gage and Facing Tool With Plate.

The Ford triple gear gage and facing tool with plate consists of a mounting plate to hold the triple gear securely while the bushing flange is being faced off. The gear is held on the plate by two locating



New Oil-Reclaiming Outfit Which Makes It Possible to Re-Claim Motor Oils Profitably.

Another improvement in National Cash Registers. Low-priced receipt printer.



To all merchants:

When you press a key on this register—

- ① It shows the price of the article.
- ② It prints a record for the merchant.
- ③ It prints this receipt for the customer. →
- ④ It opens the cash drawer.
- ⑤ It adds up the money received for the day.

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Amount of
Purchase Shown
Above

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Now there is a receipt-printing National Cash Register for every line of business.

Old registers bought, sold, repaired, and exchanged.
Easy payments. Liberal allowance for old registers.

We make cash registers for every line of business. Priced \$75 and up.

NATIONAL

CASH REGISTER CO.

DAYTON, OHIO.

pins and the plate is attached to the drill-press table in the same manner.

It is equipped with a No. 3 Morse taper shank, and also with an adjustable collar, to gage the amount of facing to be done. The cutters are of tool steel sweeper type.

It is sometimes found, when replacing



Accurate Results Obtained With Minimum of Labor.

triple gear bushings, that the bushing flange is too thick and comes in contact with the flywheel before the gears are properly enmeshed. The old practice of filing these flanges, left an uneven surface and with no assurance of the proper dimension being attained. With this tool, it is claimed, very accurate results can be obtained with a minimum of labor.

Write the manufacturer, the Dearborn Equipment & Hinckley-Meyers Co., 1503 Tower Bldg., Chicago, for further details.

Capital Inventor Patents Process for Cylinder Pits.

A patent was recently issued to Ross D. Heacox, of Washington, D. C., an automotive engineer of many years' experience, for a process for permanently repairing scores in automobile cylinders and cracked water jackets without preheating or welding.

This process, it is said, has been thoroughly tested during the past year and a half by Mr. Heacox, as well as by a number of repairshops in Washington and the work done by the "Bull Dog" process, as it will be called, has proved satisfactory and permanent. Undoubtedly, its development will be of great interest to the automobile public and repairshops.

By the use of this new process, it is claimed, a tremendous amount of money will be saved, as blocks can be repaired by it which have heretofore been discarded as useless, and cylinder grinders may repair and keep in service blocks that are so deeply scored that they cannot be reground without greatly weakening the walls of the cylinder.

The metallic filler used in this process for repairing scores in cylinders and cracked water jackets is fused and locked into the cylinders walls and thoroughly amalgamated with the cast iron.

The filling of scores in cylinders and cracked water jackets, without preheating or welding and the consequent danger of warping and misalignment of the cylinders due to preheating has long been the desire of repairshops.

This has been nearly impossible, due to the great difficulty of getting a metal which would penetrate into the pores and amalgamate with cast iron. The metal perfected by Mr. Heacox, it is said, has stood every test and will enable scored cylinders and cracked water jackets to be repaired in any repair-shop.

Automobile owners are awakening to the fact that, when their motors lose their power, lack compression, pump oil excessively,

quickly foul their plugs in either one or more cylinders, develop knocks and piston slaps, and use gasoline out of proportion to the service rendered, the only way to cure these troubles is to have the scores filled and the cylinders reground if not perfectly spherical, and oversized pistons and rings fitted.

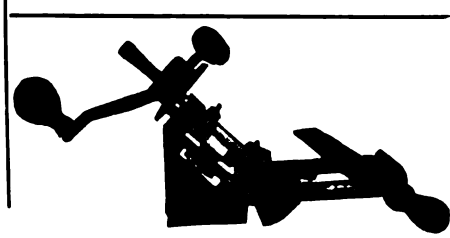
By this new process of filling the scores and regrinding, it is claimed, the original power and pep of the engine will be developed. Automobile blocks which have been used for some time have been subjected to such extremes of expansion and contraction that the blocks are thoroughly annealed.

As a seasoned casting is unquestionably better than a green or new casting, a process that can prolong the life and render more efficient the millions of automobile blocks now in use and reduce the cost of automobile operation is of great interest to automobile owners.

A company has been formed to take over this process and manufacture the equipment, and they are leasing it to cylinder grinders and large repairshops in different parts of the United States. Further particulars may be obtained by those interested by writing to the Metals Repair & Supply Co., Inc., 600 F St., N. W., Washington, D. C.

For Reseating and Refacing Work—Skinner Motor Valve Sets.

A tool outfit of more than usual interest to garagemen and repairmen generally is



Requires Less Than Eight Pounds Pressure.

the Skinner motor valve set, consisting of a reseater and a valve facer.

Imagine reseating valve-seats with less than eight pounds of pressure—merely the weight of your arm—and doing it in less

time than you ever did before. Note how the power has been separated from the pressure. Your right hand turns the handle, the left hand rests upon the pressure button, and so you feel direct every spot in the seat. You know what you are doing.

The "Skinner" bar-type, parallel-bladed cutter, made of the highest-grade tool steel, hardened by a special process, is used in this reseater. This cutter has proven to be very popular with the engineering trade because it cuts rapidly and stays sharp. It has flat as well as 45-degree cutting surfaces—a strong feature.

The reseater has four 45-degree cutters, taking 1½ inches to 2½ inches, and four pilots—5/16-inch, ¾-inch, 7/16 inch and ½-inch. In short, this is a tool for hard work and lots of it.

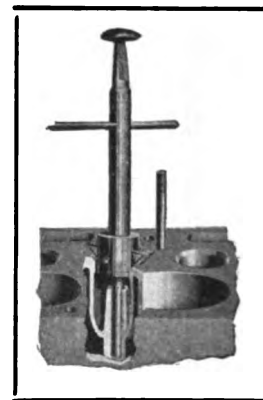
The refacer, which is the second tool of the set, takes all valves up to 2½ inches in diameter. The valve is rotated against a moving file supported by two rollers, giving the grinder speed and accuracy.

You can actually cut a true face on a warped valve-head, a valve so treated being "set" as to warp and so is superior to a new one.

It will reface tungsten valves as well as soft iron. A special hard file is furnished with the tool. This is a one-hand tool that does a regular power-set job.

A special reseater is made for Fords and Fordson, which, however, is said to be equally satisfactory on many other small-valve cars.

Complete details regarding the Skinner reseaters and refacers may be had, upon request, from the M. B. Skinner Co., 558-562 Washington Blvd., Chicago.



Skinner Refacer.

Capture Those Elusive Dollars With an HB Battery Charger.

Another very effective means of adding to the profits of the automotive and repairshop will be found in the HB belted battery charger.

This dependable charger has a 10-battery capacity and is ball-bearing equipped. It handles 6, 12 or 24 volts at one time, at a cost of from four to twelve cents each.

The HB belted battery charger may be operated from your engine or line shaft and requires 1½ hp to operate under full load. The pulley is 4 ins. by 4 ins. and the charger is equipped with a switchboard that is complete with an automatic cutout, field rheostat, pilot light, ammeter, etc.

It has a ball bearing, ten-ampere generator at 60-70 volts and a speed of 1800



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Use
discretion**

Don't Be a Mutt
You don't need to pay a big, fancy price for a good spark plug any longer. **Get a Little Jeff**
They sell at **Fifty-five Cents** retail for . . .

Besides giving you the best plug for a lot less money, we send free with every Little Jeff Plug one Little Jeff Plug Cleaner. This simple and ingenious new invention enables you to clean a set of plugs in two minutes. We will send one Little Jeff Plug Cleaner FREE to anyone upon receipt of a five cent stamp to cover cost of packing and mailing.

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Signs Designed For Your Particular Business

YOUR showroom, your garage should have an electric sign designed for your particular business. That is one advantage of Flexlumes—they have personality. Among the other advantages is the fact that they are excellent day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing the Flexlume Sign we think you need.

FLEXLUME SIGN COMPANY
25 KAIL STREET BUFFALO, N. Y.

rpm, and is furnished complete with switch-board, base tracks, pulley ready to belt, connect up and operate. The weight of the charger is 225 pounds.

The Hobart Bros. Co., Troy, Ohio, will gladly furnish complete details, upon request, to those interested.

Sunderland Service Proves Merit to Automotive Dealers.

An unusually interesting catalog has been sent out by the Sunderland Machinery & Supply Co., Omaha, Neb., under the title "Sunderland's Automotive Motor Service," giving complete information to the garage trade on motor service, pistons, rings, etc.

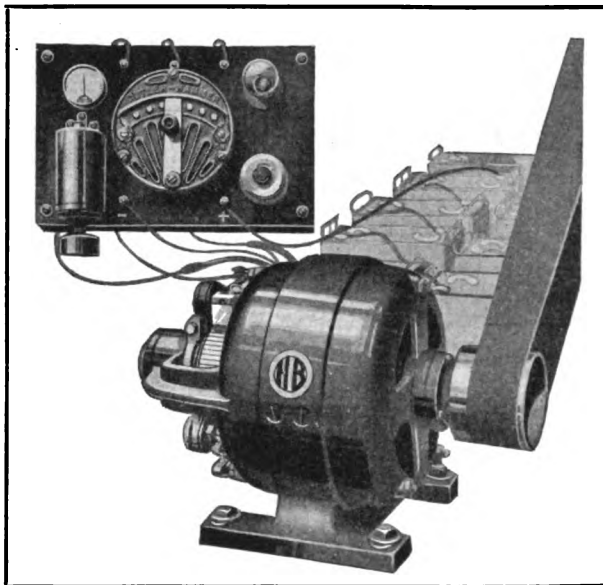
The Sunderland company has created a plant of large proportions and has placed its facilities at the service of dealers within a large area, for it contends that the expense of suitable equipment for cylinder grinding, crankshaft grinding, and other specialized motor work makes the installation of such equipment impracticable for the average dealer's service station. They attribute their success in this undertaking to the fact that they have made prompt and highly efficient service the rule.

The use of this co-operative system, it is said, enables dealers to build up a local business of a desirable class, thus providing prosperity. Dealers are assured by the Sunderland company that they may send in their orders under a promise to the

owner that his car will not be tied up for long. Dependable work is guaranteed.

Among the many types of repair work quickly and efficiently handled by the Sunderland Automotive Motor Service are:

Blacksmith work and welding, complete



This Dependable Charger Has 10-Battery Capacity.

overhaul jobs, crank-shaft grinding, cylinder grinding, cylinder scoring, stationary engine jobs, Ford motor grinding, gear cutting, general machine repair work, racing jobs and tractor jobs.

BOOK REVIEW.

GASOLINE AND OTHER MOTOR OILS, by Carleton Ellis and Joseph V. Meigs. Published by D. Van Nostrand Co., New York, N. Y. 728 pages, 6 ins. by 9 ins., 206 illustrations and 2 folding plates. Price \$10.

The question of motor fuels is becoming more important daily and is one which is engaging more and more the attention of the automotive world.

In view of this fact, it would seem that this new book—covering, as it does, a complete survey of the motor fuel field, giving a description of practically every process of gasoline making and most of the other motor fuels of promise or prominence—is a particularly timely publication.

More than 20 chapters have been devoted to the description of cracking processes, it being the opinion of the authors that these methods will undoubtedly be foremost in the

ways and means of producing motor fuels for many years to come.

It is the intention of the authors to show, the derivation of the various processes and to note the correlation of ideas.

GREB AUTOMATIC GRIP PULLER

BEACH PATENT



It looks "hard to get at" but the Greb Puller finds a way

A Greb always will. It's this versatility—ready ability to grip and pull in the almost impossible places—that makes Greb Automatic Grip Pullers so handy for shop equipment. The wire wheel hub which this Greb is forcing off, as shown in the illustration, was stubborn in yielding to any other pressure. And it didn't afford any too much room for leverage. But the Greb, with instantly adjustable jaws, takes hold and hangs on until a few turns of the wrench have taken all the "fight" out of Mr. Hub. Just three Greb sizes to handle all classes of work. Each puller comes to you with a full set of long and short jaws—really four pullers in one.

Send for information on our garage tools and equipment and our 10-day trial offer—ASK YOUR JOBBER

THE GREB COMPANY

194 State Street

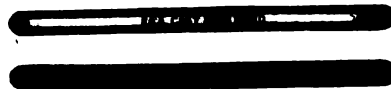
BOSTON 9, MASS.

We also manufacture the Greb Rim Tool for cross split rims (Price \$7.50) and the Greb Extractor No. E-10 for Hyatt Roller Bearing Sleeves (Price \$4.00)

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Are in Demand Everywhere



Use F. A. A. MENDS in repairing scored Cylinders, Cracked Water Jackets and Aluminum Crank Cases. They give a solid and permanent result, that is associated with scientific welding.

When you are troubled with a Scored Cylinder, Cracked Water Jacket or Aluminum Crank Case, have it repaired with incomparable F. A. A. MENDS.

It achieves more and costs less than any other. Give these MENDS a trial or ship your CYLINDERS or CRANK CASES direct to us—they will be returned the same day received.

NO REGRINDING, NO NEW PISTONS, NO WARPING or CRACKING.

Let us send full particulars—Write today.

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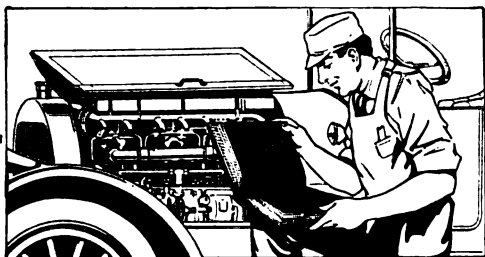
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SUPERBESTOS Folded and Stitched BRAKE LINING

is rapidly replacing woven linings because it provides a braking surface when the lining is new and affords 100% efficiency from the time installed until it is worn out. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

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Make Your Shop "Electrical Repair Headquarters"

by handling this class of work in the time-saving, cost-cutting, error-proof way—like the man in the picture above. Before he touches a tool he sees a clear, accurate blue print of the car's whole electric system and knows how to tackle the job.

The AUTOMOTIVE WIRING MANUAL

enables you to quickly and accurately repair the wiring or other electric equipment of all cars, including orphans and obsolete models. You can give your customers the kind of service for which they will not only pay handsomely, but also send their friends to you.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

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41 E. 29th St., New York

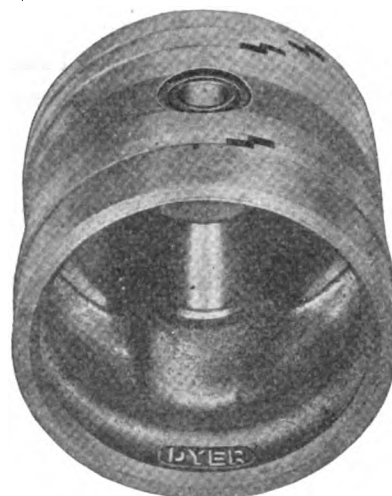
Suite 924, No. 18 Tremont St., BOSTON, MASS.
N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England. Motor Technique Bureau, 149 Strand, W. C. 2



Now Ready

A 40-page book of comprehensive data on Pistons and Piston Assembly parts, giving specifications of 800 models of motors in pleasure cars and trucks. Most complete guide of its kind ever published. Indispensable to cylinder grinding concerns, service stations and automobile repair men in general.

Write for one NOW



THE PERFECT PISTON

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Use COUPON BOOKS

**They Encourage Sales--
Place Your Business on a Cash Basis**

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

In place of a multitude of petty transactions involving endless bookkeeping is substituted a simple, self-regulating system, so easy to grasp that the most ignorant patron cannot complain nor

the most careless employe make mistakes. A coupon book has no value until issued, countersigned and dated. If lost or stolen it has no value.

The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

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Box 1472 Birmingham, Ala.

Other chapters are devoted to: Mixed oils; the testing of motor fuels; gasoline refinery practice; refining methods, distillation under pressure; the use of steam in composing heavy oils to yield naphtha and isolene; benzol, use as motor fuel and manufacture; alcohol as motor fuel; shale as a source of motor fuel; in the pyromet treatment of asphalt.

An appendix takes up "Statistics on Petroleum Products" and "The Coke Industry in 1919."

It would seem that the authors have accomplished, in this volume, the purpose which they express in the preface—to make "as comprehensive a treatise on gasoline

and other volatile fuels as it is possible to compass in the space allotted." It is an excellent book for reference purposes.

A Two-Stage Air Compressor and Two Practical Valve Lifters.

If you are planning to buy an air compressor, you will be interested in the two-stage "Twentieth Century" compressor now being marketed by the Gasco Mfg. Co., of Lancaster, Pa.

The Gasco two-stage automatic compressor is equipped with an oil stage, which, the manufacturers state, guarantees perfect lubrication. An air cooler and fan

blade flywheel eliminate overheating and insure cool air.

The air is forced from the larger cylinder through the cooler or radiator into the smaller cylinder, thus enabling a relative capacity of the two cylinders of four to one. The air is pure, and without oil or moisture, being filtered through a purifier in the improved expansion chamber.

The Gasco compressors are equipped with an unloader, which permits the motor to start without load.

The two cylinders and the crankcase are all cast in one, also machined in one operation, which insures perfect alignment. The pistons are connected by a yoke, making a three-piece construction. The pistons are entered through an opening on one side of the compressor, which can be opened without removing the belt.

The crankshafts used in Gasco air compressors are drop-forged, 1½ inches in diameter, perfectly machined and ground. The connecting-rods are also drop-forged, the crankshaft end babbitted and shimmed so that adjustment can be made at any time.

The air tank is of steel and the compressor is equipped with pressure gauge, ¼-in. needle valve, 25 feet of best hose, high grade air chuck and brass taper hose connection attached.

The Gasco company is also offering two valve lifters which will prove interesting to repairmen and dealers alike. One is the parallel-jaw valve lifter, in which the jaws remain parallel through the entire lift, thus eliminating all possibility of the washer or spring binding on the stem and raising the valve.

Two extra jaws of different size are furnished with each tool, all being interchangeable. By simply removing a fulcrum pin one size jaw can be removed and another size attached. Each jaw has a different size opening, and the combination of these sizes make the tool adaptable to practically all sizes and types of motors.

The locking device is entirely within the handles and stays locked, allowing the operator to use both hands to extract key. The locking device does not protrude through the handle and get in the way.

This lifter is not only adapted to removing valves, but is especially designed for replacing them, the jaws being thin. It is so constructed that it is reversible, making it universal throughout.

The second lifter is known as the special K-D lifter for Ford cars. The parallel jaw feature is the same in this lifter as in the first lifter described. The locking device is so constructed that it can be operated by the thumb when removing valves. This lifter is qualified to lift all Ford valves with great ease.

The K-D valve lifters are made entirely of pressed steel, which makes them not only strong and durable, but light in weight and easy to handle.

WASHBURN

OXY-ACETY-WELDING OUTFIT

1—18-inch Welding Torch
7—Welding Tips
1—2-inch Oxygen Regulator—50-lb. gauge
1—C Acetylene Regulator
22 ft. Hose

Price Complete\$45.00

LEAD-BURNING - BRAZING RADIATOR REPAIRING and SOLDERING OUTFIT

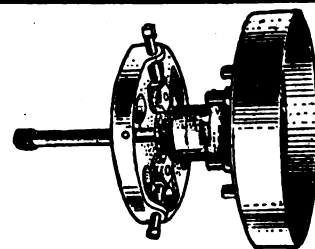
1 Washburn Torch
1 Mixing Valve (Tank Attachment)
1 Soldering Iron Attachment
2 Six-foot Hose Lengths
Hose connections
1 Prest-o-Lite Tank Key

Price Complete\$19.50

Complete Line of Lead Moulds

The Washburn Burner Corp.
General Office and Works
Kokomo, Ind. U. S. A.

The F. & W. Universal Wheel and Gear Puller is the only tool made which can be fastened to the hub threads of any automobile.

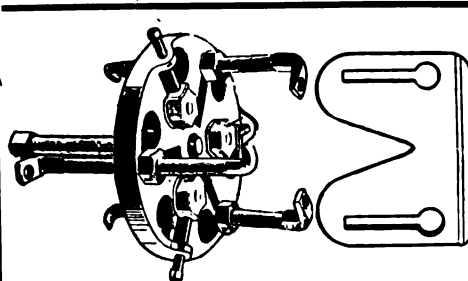


Strength and wide range of adjustment make this tool superior for gear pulling and arbor press work. Malleable plate for press shown at right of complete tool below. Note material used; heat treated nickel steel arms; hexagon blocks and large power screw are hardened malleable castings

Each of the six sides of hexagon blocks shown above has different size thread for engaging any hub thread. Adjustable to hubs of various diameters. Any mechanic knows the advantage of pulling direct on hub instead of the old awkward method of hitching to spokes.

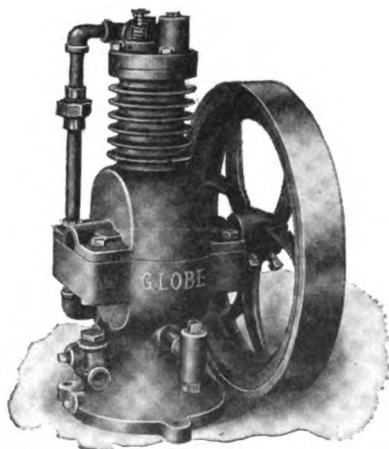
List price complete, \$32.00
Write for discounts.

LEWIS & MILLIGAN, INC.
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Horner, Greene & Wilde, Ltd.,
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GLOBE TYPE D

A Brand-New Single-Stage Compressor
High in Quality—Low in Price



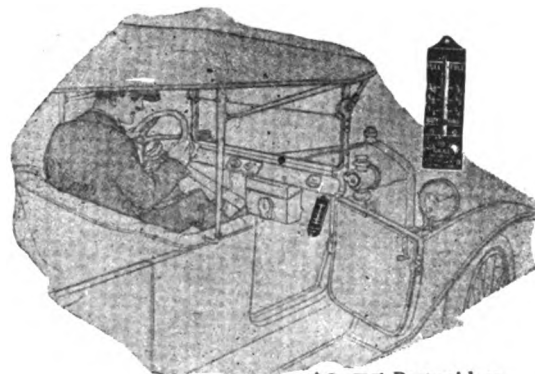
Furnished in five different equipments. Designed for Private Garages, Small Public Garages, Tire Shops, etc.

The addition of this new single-stage compressor to our two lines of two-stage compressors, makes the Globe the most complete assortment of Garage Compressors on the market. One for every requirement.

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The only scientifically correct and accurate gauge on the market. Registers in plain view of driver on dashboard. One of the most remarkable conveniences ever devised for Ford cars. Sold with unconditional money back guarantee.



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No Wires—
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Write today for wholesale prices and exclusive territories. Nationally advertised. — Booklets and Circulars furnished.

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More Power for the Buick

When the valves of the Buick become fouled with carbon they do not seat properly and there is a noticeable loss of compression and power. With clean valves the motor runs smoothly. Each cylinder receives and discharges regularly, giving that sharp, snappy exhaust which demonstrates that the motor is giving the maximum power.

The peculiar valve construction of the Buick makes it difficult to remove the valves for cleaning with ordinary tools. The best device made for this purpose is the

BUFFUM BUICK VALVE REMOVER

It is the only tool that will properly remove the Buick valve from assembly. It is quick, sure and safe, eliminating the danger of bending washers, valve stems and valve springs or breaking the valve cage. The breaking of any of these parts may lay up the car for days and weeks. Fits Buick motors of all sizes since 1912. Is strongly built of the best materials, yet is light and compact.

Every garage and repair shop should have one as regular equipment. Dealers find them ready sellers to Buick owners, who should carry them, especially in touring, as they may get broke down out in the country where a garage might ruin valve cage.

Retail Price \$2.00. Fully Guaranteed.
Write for Trade Prices.

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Factory and General Offices
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GANSCHOW GEARS

for service and reliability

The quality of our gears is almost proverbial in the automobile trade. Our unexcelled facilities and broad experience enable us to give you the most efficient service and engineering advice on every kind of automobile gears and transmissions.

We are prepared to furnish promptly transmission, differential and timing gears, and any other parts made from either open hearth, nickel, chrome vanadium or any other alloy steel, for any car of either American or foreign manufacture. Workmanship and quality guaranteed.

Write today and feel free to consult our Engineering Department.

Wm. Ganschow Company

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Chicago, Illinois

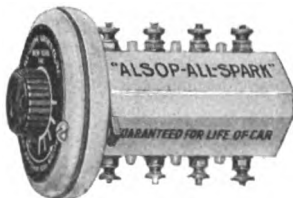


Save \$135 a Year on your Ford
Much more on other cars and especially trucks

ALSOP-ALL-SPARK

Is an indispensable part of your car

YOU CANNOT AFFORD TO BE WITHOUT IT
Best by Government Tests. This simple little device does away with spark plug and carbon troubles.



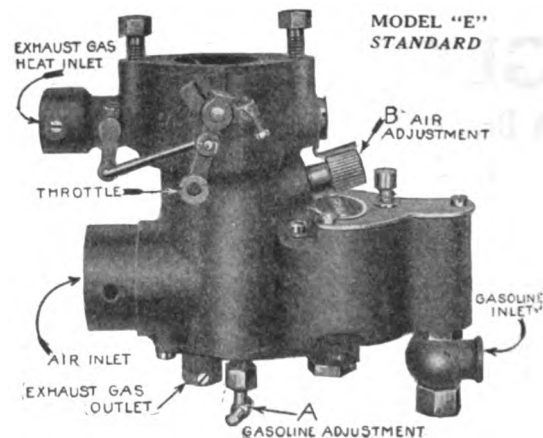
Saves gas, battery, oil, piston rings, repairs, depreciation, no overhauling on the road and many other advantages that spell car satisfaction. Send your order today—Circular on request.

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Cost complete, with money-back guarantee \$7.50

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Universal Satisfaction

POWERFUL—

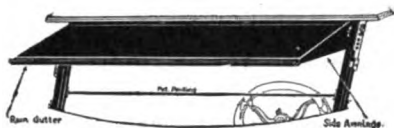
ECONOMICAL—

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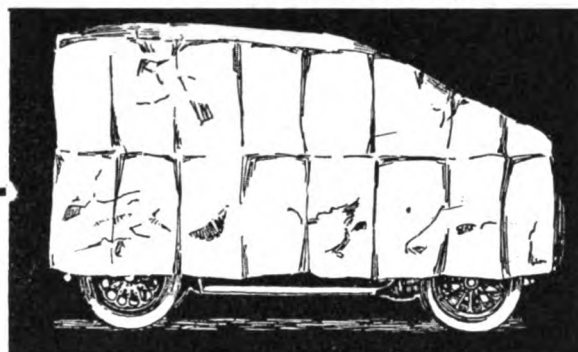
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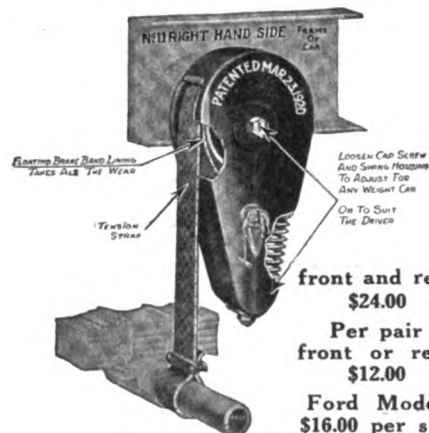
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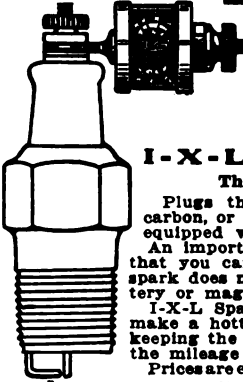
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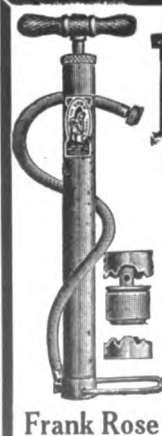
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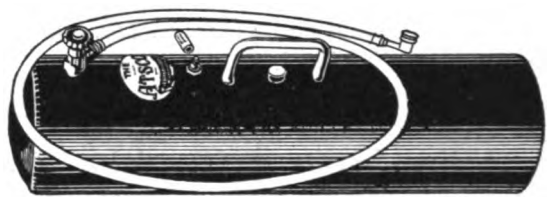
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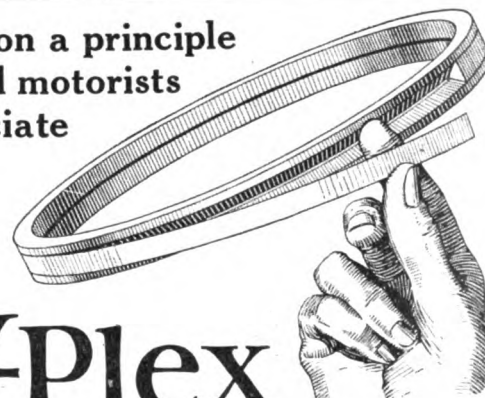
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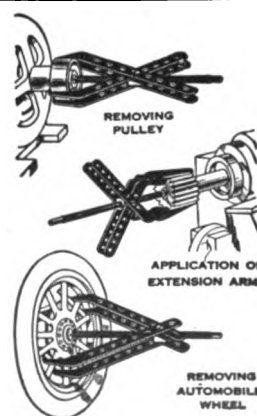
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Index to Advertisements

A	J
Adamson Mfg. Co. —	Jenkins Vulcan Springs Co. —
Alr-Tight Steel Tank Co. 56	
Albertus & Co., F. A. 50	K
All-Spark Ignition Co. 54	Kennedy Car Liner & Bag Co. 55
All-Spring Shock Absorber Mfg. Co. 61	Krasberg Plaston Ring Co. 57
American Bolt & Screw Case Co. —	
Am-pe-co Sales Co. 59	L
Atlas Auto Supply Co. —	Laminated Shlm Co. 56
Auto Specialties Mfg. Co. 5	Leich Electric Co. 4
Automotive Publ. Co. 51	Leitch-Nelson Co. 53
	Lewis & Milligan. 53
B	Loudon, Inc. —
Bailey Co., Geo. D. —	
Boddy, J. Newton. 57	M
Boe Mfg. Co. 56	Magnet Light Co., The. —
Bowes Co., Robt. M. 57	Marvel Carburetor Co. 54
Brewer Specialty Corp. —	Marvel Machinery Co. —
Brunner Mfg. Co. 62	Metal Stamping Co. 58
Buffum Tool Co. 54	Mikesell Bros. Co. 51
Burd High Compression Ring Co. 59	Motor Salvage Co. —
Burgess-Norton Mfg. Co. —	
Butler Mfg. Co. 58	N
Butterfield & Co. 55	National Cash Register Co. 47
	National Refining Co. 39
C	National Rubber Filler Co. —
Catelain, Andre G. 58	New Era Spring & Specialty Co. 55
Challenge Battery Co. —	
Champion Pneumatic Machinery Co. 6	P
Channon-Hughson Co. 55	Paro, H. G. Co. 57
Chicago Solder Co. 6	Premier Electric Co. 59
Clark Co., W. L. —	
Commercial Mfg. Co. —	R
Curtis Pneumatic Machinery Co. 41	Reynolds Spring Co. 56
	Romort Mfg. Co. 3
D	Rose Mfg. Co., Frank. 56
Dearborn Equipment & Hincley-Meyers Co. 5	R. T. Mfg. & Sales Co. 59
De Mund Sales & Service Co. —	Rust Products Co. —
.....Inside Front Cover	
Dickerson, C. A. 57	S
Drake & Co., Frederick J. 61	St. Paul Welding & Mfg. Co. —
Dunton Co., The M. W. —	Sampson Electric Co. 59
Dyer Co., The. 51	Sawyer-Weber Tool Mfg. Co. —
	Schrader's Son, Inc., A. 7
E	Shaler Co., C. A. Front Cover
Eclipse Valve Grinder Co. —	Smith Co., The W. J. —
Ever-Tyte Piston Ring Co. —	Southern Coupon Co. 52
.....Inside Back Cover	States Chemical Co. 8
	Stiles Mfg. Co. —
F	Storm Mfg. Co. 56
Fairbanks Co. —	Sunderland Machinery & Supply Co. —
Farmers' National Life Insurance Co. 58	
Federal Electric Co. 45	T
Flexlume Sign Co. 49	Taylor, H. D. Back Cover
Foster Bros. Mfg. Co. 58	Trindl Co., The. 58
	Tungsten Mfg. Co. —
G	
Ganschow Co., William. 54	U
Garden City Spring Works. 59	U. S. Air Compressor Co. —
General Accessories Corp. 49	Universal Mfg. & Sales Co. 56
Globe Mfg. Co. 53	
Graff-O Products Co. —	V
Greb Co. 60	Van Trump-Eselbey Co. —
Green Engineering Co. 58	
Greenfield Tap & Die Corp. —	W
Greer College of Motoring. 58	Wagner Specialty Co. 58
	Warshawsky & Co. 58
H	Washburn Burner Corp. 53
Harvey Spring & Forging Co. —	Webber Co., P. H. 41
Hauck Mfg. Co. —	Western Rubber Mold Co. —
Hicken Sod-Tor-Lite Co., B. E. 59	W. H. S. Mfg. Co. 61
	Worcester Abrasive Co. —
I	
Indiana Parts Co. 43	Z
	Zinke Co. 3 and 56

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Durabilt Spark Plugs

NEVER QUIT YET

COMPRESSED ASBESTOS CAP POSSESSES HIGH MECHANICAL STRENGTH

ELIMINATES ACCIDENTAL BREAKAGE

PORCELAIN ENTIRELY ENCLOSED SUBJECT ONLY TO ONE TEMPERATURE

ELIMINATES OVERHEATING DUE TO OPPOSITE TEMPERATURES

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ELIMINATES CRACKING & BREAKAGE DUE TO UNEQUAL EXPANSIONS

DURABILT PLUGS SELL ON PERFORMANCE

The design and construction of these plugs are such that they have the ability to **STAND UP** in the severest service. The remarkable success of this plug is due entirely to its unusual performance. Dealers: write today for descriptive matter and prices.

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Cleaning Engines	Paint Spraying
Motors and Spark Plugs	Valve Grinding
Riveting Frames	and Drilling

Be sure to consult our engineers on the practical possibilities of compressed air.

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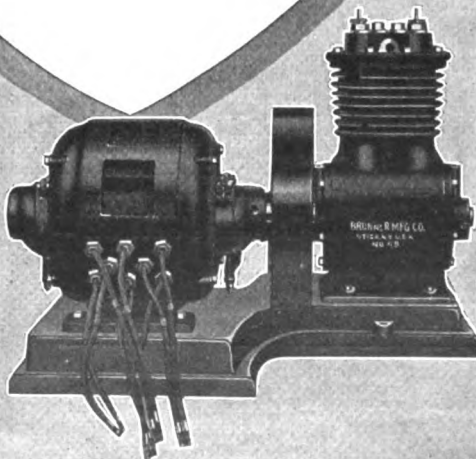
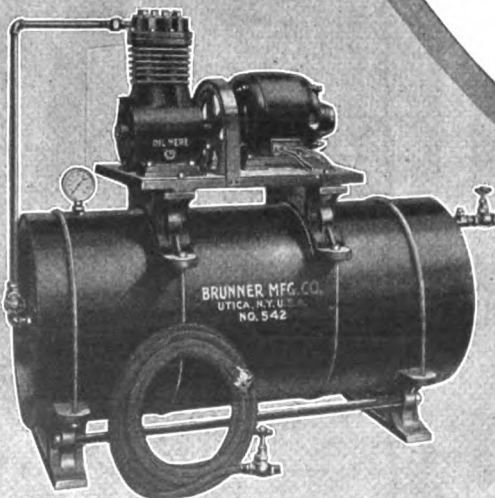
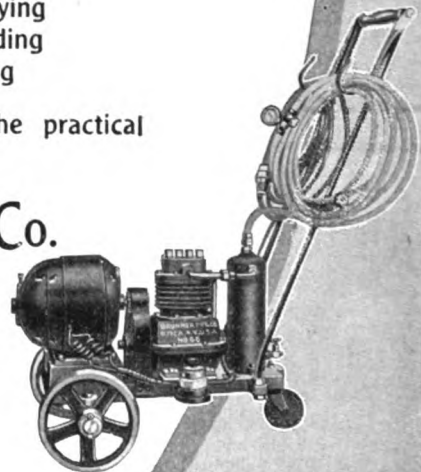
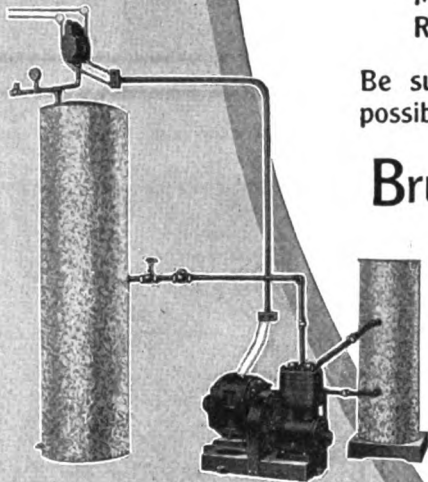
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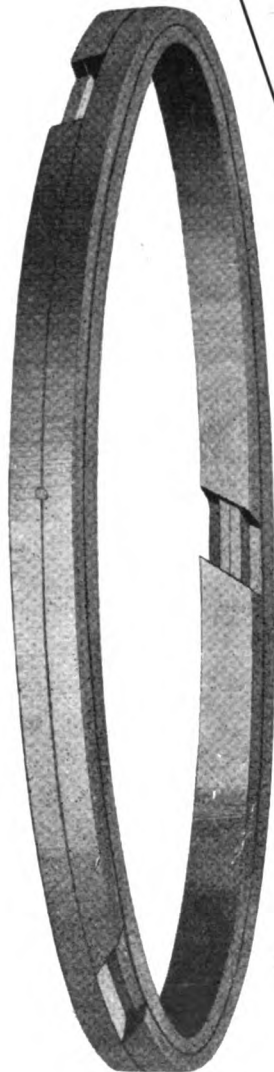
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Conclusive Evidence of Ever-Tyte Superiority

This evidence has been
published in 10 volumes

If you have received none, send
for one, stating kind of unit in
which you are interested.



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(Established 1898)
JEROME PLANK, PROP.
Garage and General Blacksmithing
Cabs and Truck Bodies to Order
211-215 SOUTH MARKET STREET
PHONE 190
Springfield, Mo. April 28, 1921.

Ever-Tyte Piston Ring Division,
Walter A. Zelnicker Supply Co.,
St. Louis, Mo.

Dear Sirs:--

Enclosed find check for last lot
of rings ordered. Please accept my
thanks for the care and promptness with
which my frequent orders are filled.

We have installed Zelnicker Ever-
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stopped some serious troubles by their
use. The way our customers talk back
to us indicates we are doing them a
favor by installing your rings.

We are greatly pleased with the
satisfaction they give and look forward
to some very nice business in handling
them.

Respectfully yours,

PLANK'S GARAGE,
Jerome Plank
Proprietor.



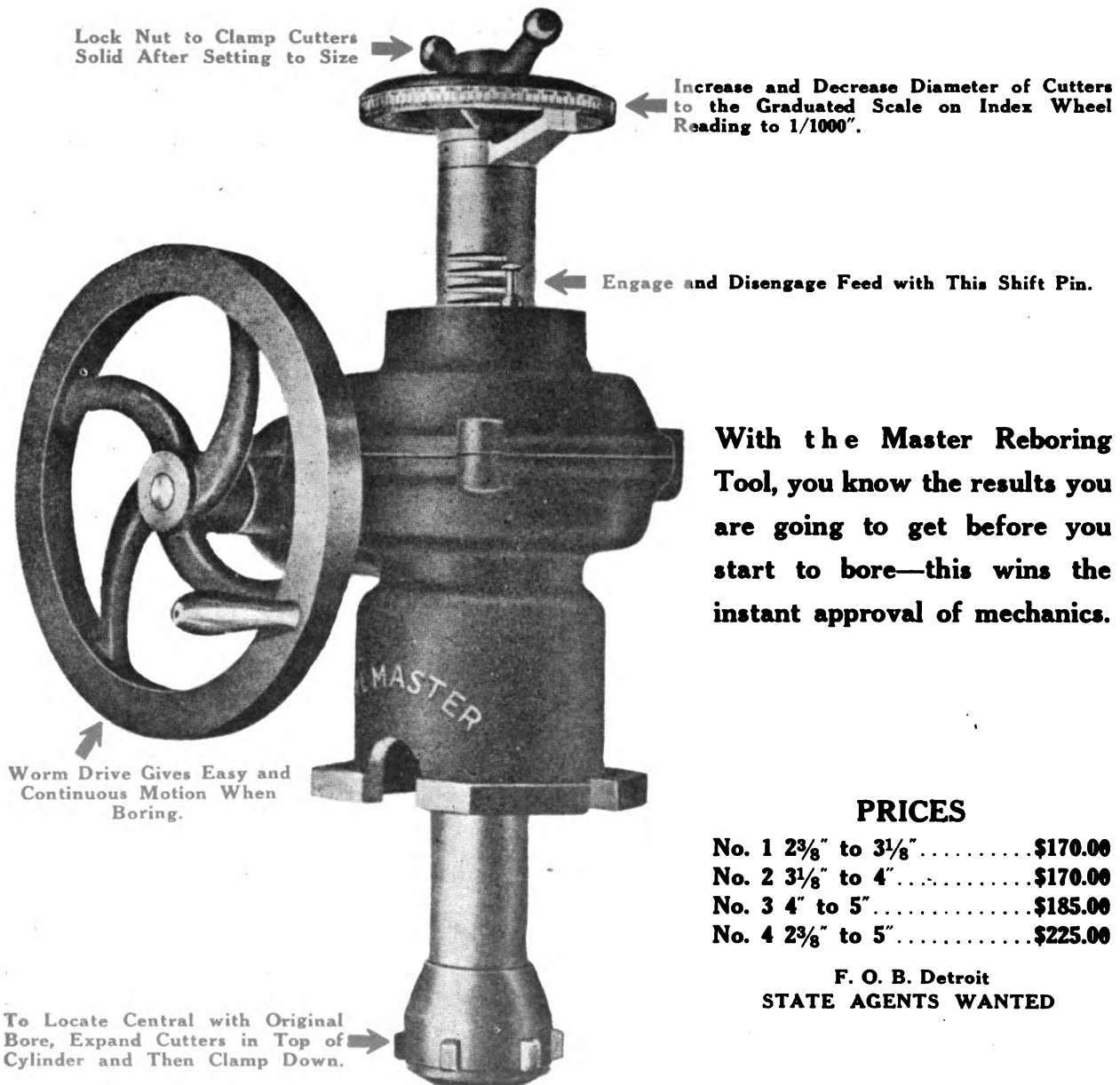
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Ever-Tyte
**The Piston Ring
for All Engines**

EVER-TYTE PISTON RING DIVISION
WALTER A. ZELNICKER SUPPLY CO.
Wellston St. Louis

TRY THEM AT OUR RISK

EARN \$60 PER DAY WITH THE MASTER

This wonderful machine will indicate its alignment with original bore, and insure a perfectly round, smooth, straight cylinder at one pass through. The graduated wheel at top enables you to set cutters to any size desired instantly, and shows at all times the size you are boring. The efficiency of the Master is guaranteed.



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PRICES

No. 1 $2\frac{3}{8}"$ to $3\frac{1}{8}"$	\$170.00
No. 2 $3\frac{1}{8}"$ to 4".....	\$170.00
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TO ALL PARTS OF THE
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FOR SALE BY
H. D. TAYLOR
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Terms that are bound to please. Write for interesting payment plan.

American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

OCTOBER, 1921

Vol. 17.—No. 10.
10 Cents the Copy.
\$1.00 Per Year.



Simplest and only lasting Puncture Repair
NO CEMENT — NO GASOLINE — NO DELAY
SHALER
ASK US TO SHOW YOU
USED BY OVER A MILLION MOTORISTS
5 Minute Vulcanizer

This Window Display Brings Them In to Buy

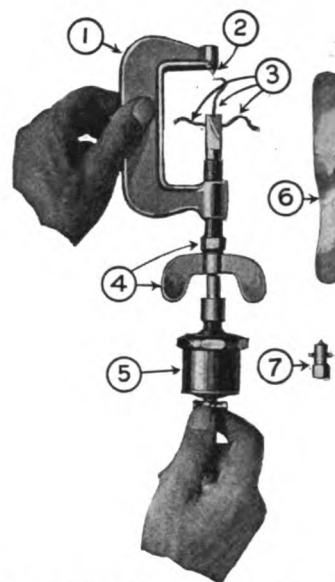
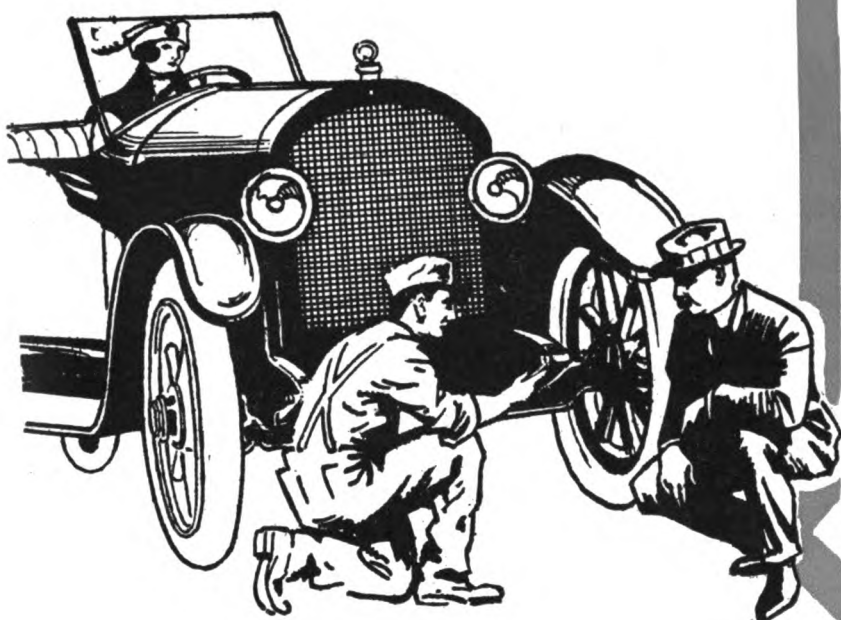
Our new, nearly life-size, window display, lithographed in natural colors, is a winning salesman for Shaler 5-Minute Vulcanizers. On your counter—or in your window—this display makes sales easy. Put it in your window and it will bring new customers who will become steady customers.

Best Business Builder **A Money Maker for Dealers**

Every sale of a Shaler 5-Minute Vulcanizer is *more* than only one sale and one profit—it brings additional sales from the same customers, because they each need to buy the Patch-&-Heat Units regularly for use with the Shaler. This big repeat business comes to you—brings you regular profits—in addition to your profits from selling Shaler Vulcanizers—and without any effort on your part. Regardless of times or season the Shaler Vulcanizer brings new customers and steady repeat sale profits.

***Write NOW for SHALER Window Display
and Our Sales Helps for SHALER Dealers***

C. A. Shaler Company, 359 Fourth Street, Waupun, Wisconsin



Patented Aug. 31, 1921. Others Pending

The Turner Spring Lubricator

**spreads your spring leaves
and lubricates with one
operation—**

The TURNER (2 in 1) SPRING LUBRICATOR does away with the muss and bother that usually attend the greasing of springs. It makes it easy to keep the springs properly lubricated so that they do the skidding instead of the car. The spring leaves are forced apart with little effort and the grease is spread in three directions reaching every part of the surface.

The motorist with a Turner Lubricator can increase the riding qualities of his car 50%. It makes the springs outwear the car—eliminates those deafening squeaks—prevents spring breakage. It saves the tires—makes steering easier and causes the driver to smile with satisfaction.

PRICE, \$2.50

DEALERS—Every car owner will want a Turner (2 in 1) Spring Lubricator, *Write today for trade prices.*

THE TURNER MFG. CO.
KOKOMO, INDIANA

No. 1—Lubricator Body, a drop forging that will stand any strain. Will spread any spring up to 2½ in. diameter.

No. 2—Guide Pivot, hardened tool steel spreads inside spring leaves.

No. 3—Leaf Spreader and Lubricating Nipple, hardened tool steel, distributes grease in three directions.

No. 4—Large Malleable Steel Thumb Screw, also Hex Head for Wrench Hold, forces spring leaves apart with little effort.

No. 5—Compression Grease Cup of large capacity forces the grease to the middle of spring leaf and shoots it in every direction.

No. 6—Flexible Steel Blade with which the lubricant is spread the entire length of the spring leaf, only one insertion of spreader in the middle of each spring leaf necessary to lubricate entire leaf.

No. 7—Alemite Grease Connection, we can furnish upon request grease connection to fit any greasing system such as Alemite, Anco and others. These connections to displace our regularly equipped grease cup.

No. 3—Illustrating how grease is actually shot in every direction while between Spring leaves.

It Brings You The Business

There's always plenty of business for the garage equipped with a ROMORT AIR and WATER STATION. Why? Because the ROMORT attracts an endless chain of motorists, brings them right up to your doorway and renders the kind of service that makes them glad to reciprocate by giving you their business.

Car owners actually go out of their way to use ROMORT SERVICE—they appreciate its cleanliness and efficiency—the suspended air hose that never dangles in the mud and dirt to soil the hands and clothing when used—the ease with which it reaches all four wheels without moving the car—the patented governor that automatically returns the hose arm to a vertical position after using and eliminates the bother of putting the hose away—the convenient water hose with the hand grip valve that does away with carrying the clumsy old water bucket.

Like a "live wire" salesman the value of the Romort increases with age, bringing you new customers and increasing the business of the old.

Every day you are without it means you are losing the trade of both.

HOW LONG CAN YOU AFFORD TO LOSE?

To meet all requirements the ROMORT is built in five styles, with and without electric light globes, including types for indoor ceiling and outdoor wall installation.

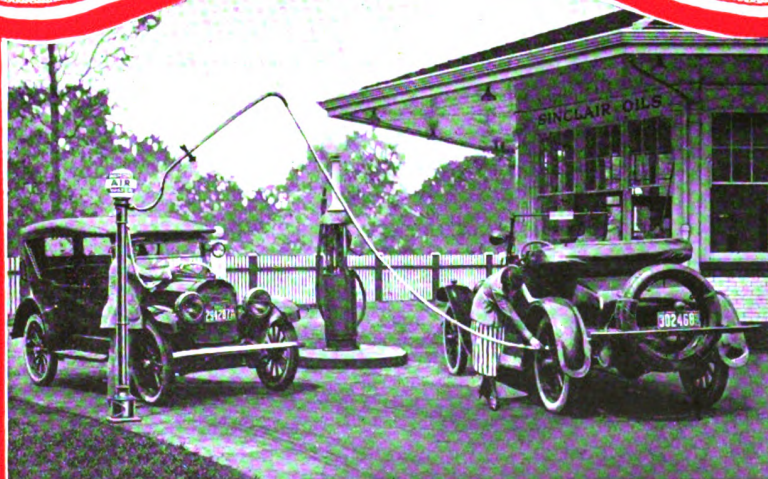
A postal addressed to our sales department will bring full details by return mail.

"BEAT YOUR COMPETITOR TO IT"

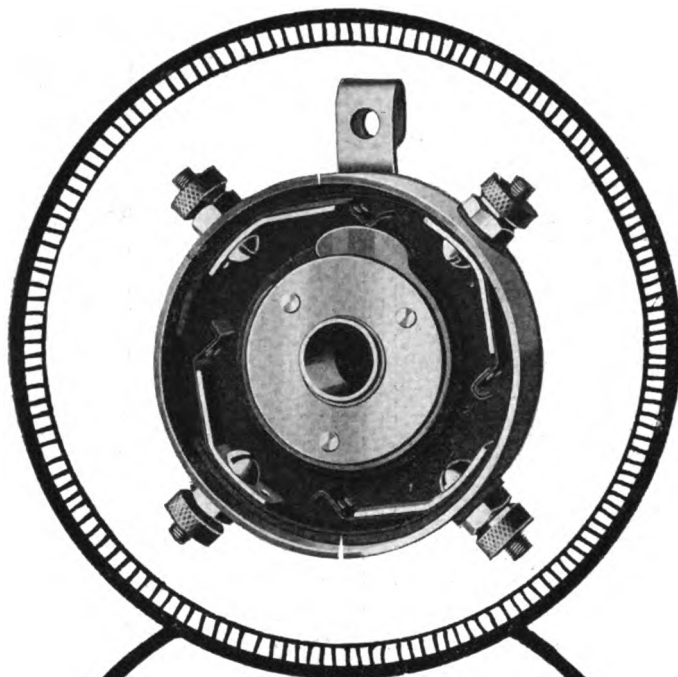
Manufactured by
ROMORT MFG. CO.
Oakfield, Wis.

Sales Dept.
THE ZINKE COMPANY
1323 Michigan Ave., Chicago, Illinois

ROMORT AIR AND WATER STATION



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Longer Life *plus* Positive Performance

THOSE are the qualities that Ford owners desire in a timer. They actually get them in full measure in the

LEICH

MAGNETIC TIMER

Designed by engineers of wide experience on automotive ignition this new timer offers the following advantages:

- Wear reduced to a minimum.
- Non-breakable springs.
- Rotating, magnetic, contact-making device that functions properly regardless of engine vibration.
- Uniform and perfect electrical contact at all speeds.
- No interference with the proper electrical contact between the springs and rotor by oils and grease.
- Insulating materials impervious to moisture and grease.
- Satisfaction.
- The magnet does it.

DEALERS—Ford owners will soon be asking for the LEICH Magnetic Timer. Send in the coupon and learn all about it.

LEICH ELECTRIC CO.
Manufacturers of RADD Spark Plugs

Genoa — — — Illinois

LEICH ELECTRIC CO.
Genoa, Ill.

Please send me complete information and prices on the Leich Magnetic Timer.

NAME

ADDRESS

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

Editorials

The "Hill of Prosperity".....	9
Public Garages a Necessity.....	9
Insurance Hazards.....	9
Waste in Industry.....	10
Service Builds Business.....	10

General

Business Is Better Here—No Wonder! by K. H. Lansing	11-12
Does All-Tire-Accessory Store Pay? by C. M. Adams	13
Pike City Has a Mooses Convension, by Frank Farrington	16-17
Insuring the Compensation Risk, by Chesla C. Sherlock	19
Testing and Repairing the Magneto, by L. R. Van Valkenburg	20-21-22
Legal Rulings of Interest to Garagemen, by R. R. Rossing	25
Focusing the Headlight Bulbs, by Robert Livingstone	27-28
Glimpses in the Garageman's World.....	29-30
My Experience with an Automobile, by J. N. Bagley	35-36-38

Departments

Accounting, by J. Newton Boddy.....	14-16
Welding, Cutting and Brazing Practice, by David Baxter	23-24
Practical Hints for Shop Mechanics.....	31-32
Readers' Questions and Answers.....	33-34
Accessories—Dealers' Key to Profits.....	40-42-44-46
Up-to-the-Minute Garage Equipment.....	48-50-52

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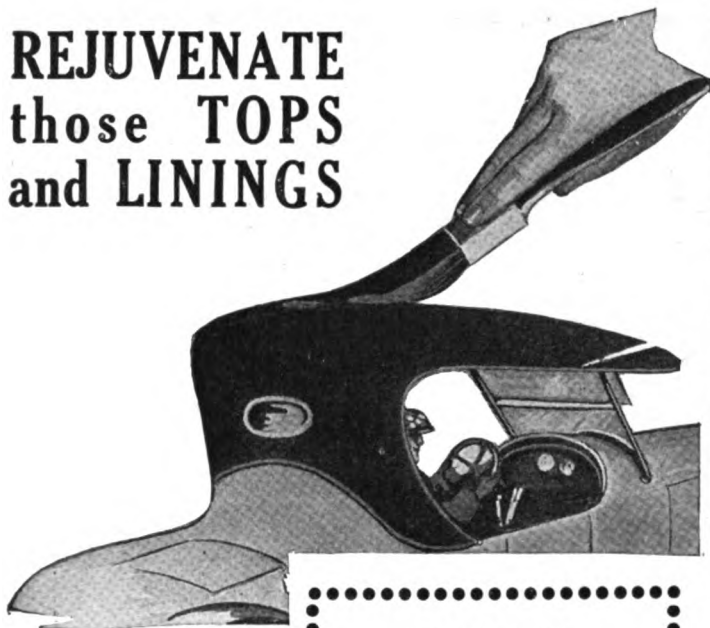
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BURBANK TOP DRESSING (Black)

Re-dyes, waterproofs and re-rubberizes the material, giving the top that nice new appearance and a rich black color. This Burbank Top Dressing is adapted especially to Ford and Willys-Overland cars having cloth tops, also for the imitation of Mohair Cloth.

Pts. 85c Qts. \$1.60

Also furnished in Olive Drab for light colored cloth tops.

BEATS ALL DRAB LINING DYE

Lends neatness and newness to the appearance of the linings and adds materially to the value of the car. Not an ordinary dye but one made to withstand the most severe weather conditions.

Rich in color, it covers those worn creases where the top folds. One application entirely effaces discolored spots where water has leaked through.

Also furnished in Black and Grey.

Pts. \$1.50 Qts. \$2.75



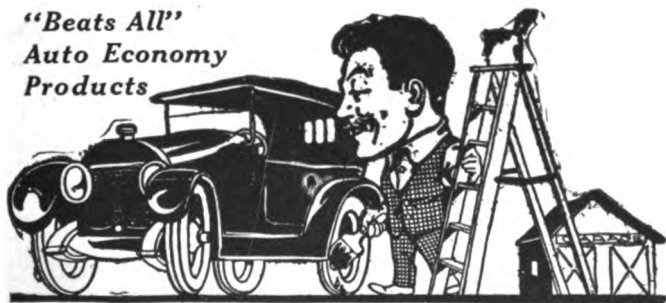
DEALERS—You need "Beats All" Products for your customers and your repair shop—also for those used cars you are fixing up for re-sale. Ask your jobber or write us for descriptive catalog, and Dealers' discount.

Auto Specialties Mfg. Co.

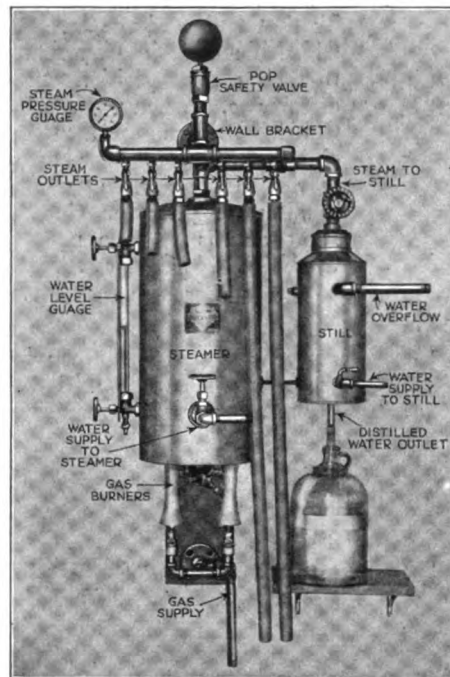
40 Elm Street

Buffalo, N. Y.

"Beats All"
Auto Economy
Products



"BUILT TO STAND THE GAFF"



Boiler capacity 2-10 lbs. pressure according to number of lines in use.

Safety valve set at 10 lbs.

Still capacity, 1 to 2 gals. Chemically Pure Distilled Water Per Hr.

Dimensions, 47x24x18 inches.

Shipping Weight 100 lbs.

Size No. 151 is equipped with Gasoline or Kerosene Burners.

The Polarstil and Steamer

Is all that it looks—A sturdy, safe and practical boiler and water still, built by a concern with a world wide reputation. Our products are recommended by Engineers and Chemists everywhere.

The boiler is tested to 100 lbs. hydrostatic pressure and safety valve pops at 10 lbs. Tank is insulated and covered with copper jacket. The water still is a POLARSTIL—copper with pure block tin interiors.

Comes to you complete with wall bracket and all ready for simple water and gas connections.

You owe it to your business.

Write for Literature.

JEWELL POLAR CO.

565 T. W. Van Buren St.

CHICAGO, ILL.

Champion Equipment gives the biggest measure of satisfaction for the money

To that end we have developed CHAMPION Air Compressors to their present position of pre-dominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

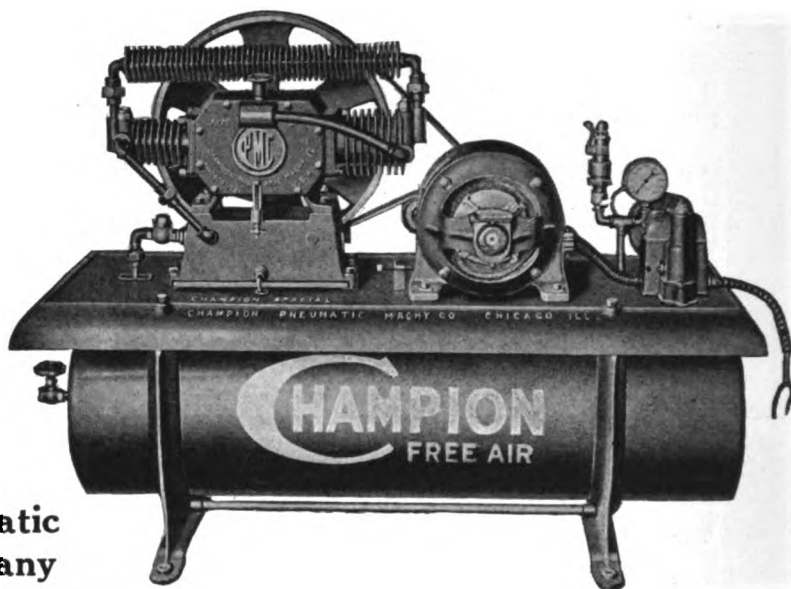
An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

Champion Pneumatic Machinery Company

1403 So. Michigan Ave.

Chicago, Illinois



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

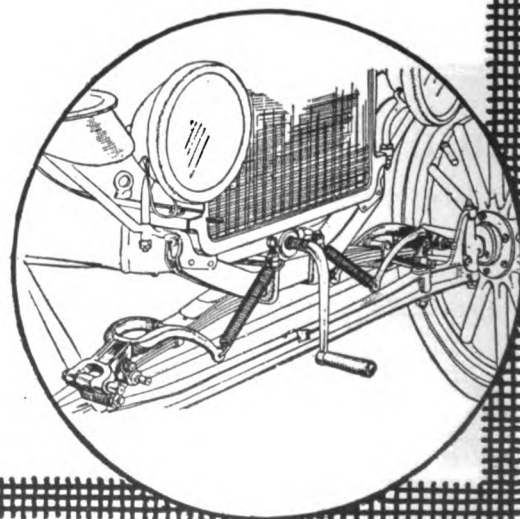
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers.

A stock of Brobst Equalizers will make your cash register ring

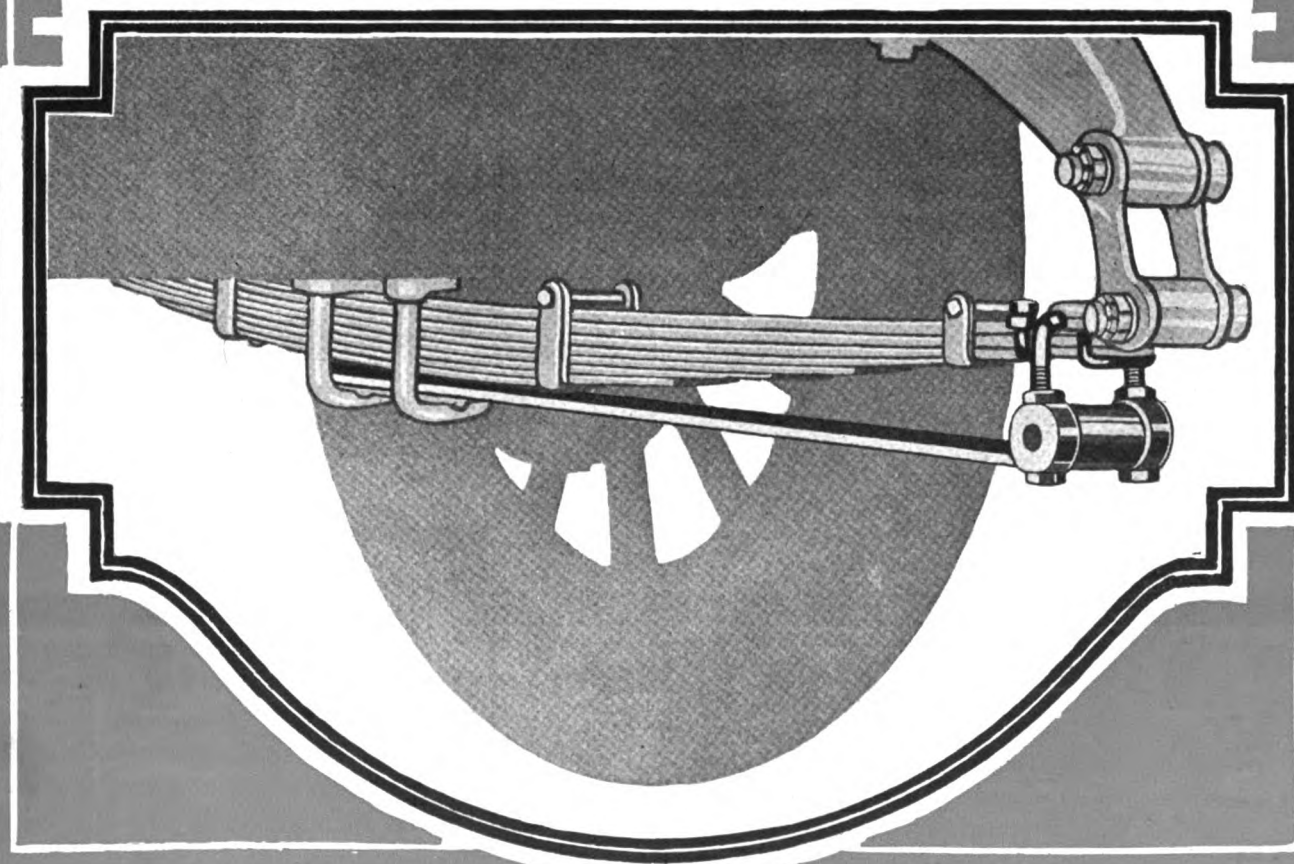
CAR OWNERS expect full value for their money nowadays. When they learn that you are handling BROBST EQUALIZERS, which sell at about one-third the price of other good shock absorbers, they will drop in to see what it is like and having seen it will buy.

BROBST EQUALIZERS provide an effectual means for absorbing and cushioning the recoil of motor car springs. When springs are designed to carry a certain load they act more efficiently under a full load than under a partial load. BROBST EQUALIZERS make the car ride the same loaded as unloaded by *equalizing* all shocks and road strains. They also—cushion recoil of springs—prevent breaking of springs—minimize side sway—increase tire life as even road contact is produced—greatly increase efficiency of springs.

BROBST EQUALIZERS are making good in every part of the country—numerous unsolicited testimonials show the exceptional satisfaction they are giving to car owners. Their low price and effectiveness make them quick and easy sellers.

DEALERS—Write or wire for territory and trade prices.

DEMUND SALES AND SERVICE COMPANY
Indianapolis Indiana





SPEE-DEE
is shipped to the
trade in case lots—
36 cans (3 doz.) to
the case.

Speed-dee

is your
best bet
NOW

SPEE-DEE is a consistent seller the year around and this is one feature that makes the demand especially strong in winter.

When the motorist is caught on the road with engine or tire trouble the necessary adjustments leave his hands soiled and greasy. Using gasoline means chapped or cracked hands and water won't remove this kind of grime. In a case like this there is just one thing the car owner can use with satisfactory results—SPEE-DEE.

A teaspoonful is rubbed into the soiled hands and the grease and grime quickly disappear, leaving them soft and marvelously clean. This feature makes SPEE-DEE positively invaluable in cold weather.

Just tell any car owner or driver how he can clean his hands with SPEE-DEE and he will gladly buy a can. He will find so many uses for it that he will be back—again and again—for more. The certainty of repeat business makes it worth while to take a little trouble to effect the initial sale. Hundreds of dealers have built up a highly profitable patronage in this manner.

Make SPEE-DEE your winter leader. You can't find a better one. Retail price is moderate; trade discount is liberal. We furnish dealer helps and active cooperation in preparing window and counter displays. Write us at once.

STATES CHEMICAL CO.

680 W. Austin Ave.

CHICAGO, ILL.



SPEE-DEE

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 10.

CHICAGO

OCTOBER, 1921

The "Hill of Prosperity."

"Our whole agricultural population is now reconciled to the new order. They were sore and blue as they could be for months, when three-dollar wheat disappeared," declared B. C. Forbes, a recognized authority on business conditions, recently.

"The whole mental attitude of our agricultural population today is healthy and sound. They are picking up more courage and cheerfulness, and you will find that there will be just as many Fords and other automobiles sold among the farmers of this country in the next twelve months as there ever were before."

We are glad to read that as it confirms our own views. Each week now indicates that definite progress is being made up the "Hill of Prosperity."

The tide has definitely turned in practically every direction. The mills and manufacturing establishments in the East are opening their doors and increasing their production. The South knows that it is facing good times—that sentiment having become evident since September 1. The railroad situation is acknowledged to be improving and whichever way we turn, evidence of changed conditions is at hand.

Public Garages a Necessity.

The public garage, frequently condemned as an eyesore to residential and business localities, and an object of constant attack in city councils, is emerging from its exiled station to be

recognized as essential to the city dweller.

In Chicago, Commissioner of Buildings Bostrom, who also is chairman of the city commission on zoning, early

LEARN A LESSON FROM YOUR ERRORS.

Never regret a mistake or waste time thinking about how sorry you are you made one. Make a decision. Then act. If you are wrong, admit your mistake or error, then go ahead and do the right thing as you see it. Never bluff or try to cover up your mistakes. Mistakes are good for you, if you profit by them—you will never make the same mistake twice.
—Chas. M. Schwab.

this month put the public garage on a standing equal to the grocery, the meatshop and the corner drug store. His action was concurred in unanimously by the zoning commission.

The public garage now becomes a living necessity, and, as such, will be given the consideration due it.

"We have been giving more than ordinary attention to the subject of public garages," said Mr. Bostrom, in discussing the matter. "We know the feeling existing toward them by owners of property adjoining, business men in the neighborhood and others. The commission realized the importance of the task in deciding the future fate of that modern business in connection with zoning.

"We have come to the conclusion that public garages have become as much a living necessity as the grocery.

"Many apartment buildings house from 60 to 100 families. Many tenants own automobiles. We believe it would be out of reason to zone the city in such a manner as to compel these people to walk one, two or three miles in order to reach a public garage."

The action of the Chicago commission in recognizing the necessity for public garages in residential sections is another indication of the important place the automobile occupies in our daily life. It has fully demonstrated its right to a recognized place in the development of our industrial, social and community life, and its power will increase as the country treads the path to normalcy.

Insurance Hazards.

The past few months there has been considerable published relative to motor insurance costs. The reduction in the prices of motor cars has had a most disturbing effect upon automobile insurance concerns. According to statements of insurance officials, the automobile departments of practically all large companies have been conducted at a loss.

Thefts of cars has contributed to a large proportion of the losses, while the tendency of juries to very frequently award excessive liability damages is also a large element in the losses. Juries appear much inclined to assess damages on the score of the pre-supposed ability of the motor car owner to pay instead of a considera-

tion of the nature of personal injuries and the loss in earning power occasioned by the injuries. These are factors which have tended to enhance insurance rates.

The cry for lower insurance rates in the ranks of the motorists has brought about serious consideration of the subject by insurance officials. A plan now under consideration by the underwriters is to eliminate the full theft, fire and collision valuation, and it is stated that the plan is very likely to go into effect early next year.

Instead of insuring a car for its full value in case of theft, fire, or a serious collision, insurance companies may decide to insure only for 75 per cent of such value, thus placing 25 per cent of the loss upon the owner. The theory is that the owner, knowing he will be compelled to bear a proportion of the loss in case of damage or loss of the car, or injury, will be inclined to give more attention to his car.

Recently the National Automobile Chamber of Commerce declared "over-valuation and ignoring the character of the policy holder are the two weakest points in insurance methods today." It is pointed out that the insurance on many of the new cars is considerably more than the market value, if the owner had to sell. This is recognized by the unscrupulous and instances are on record of cars being destroyed in order to collect insurance.

Naturally, manufacturers of motor cars are very much interested in the insurance question and undoubtedly some new policy will be worked out which will place some of the moral hazards upon the car owners—all of which will make for lower insurance rates.

Waste in Industry.

Elimination of waste in industry is receiving the attention of the United States Department of Commerce. Although this country has the highest ingenuity and efficiency in the operation of its individual industries of any nation, the American industrial machine is far from perfect.

The principal factors contributing to industrial waste include: Lost labor during business depression; speculation and over-production during booms; labor turn-over; labor conflict; failure of transportation, fuel and power supplies; loss due to processes and materials; excessive seasonal operation; and lack of standardization.

All of these factors combined have resulted in a huge deduction from the

GREAT MEN—AVERAGE MEN.

When I was young I used to wonder if I would ever meet a great man. The great man, as my imagination clothed him, was a being of imposing figure in whose presence you actually trembled.

Well, I've met a lot of men—some of whom the world thought were great men—but none of them has ever given me the feeling of awe that I anticipated.

So I have come to the conclusion that there are no great men. So-called great men are just average men who either had a chance or took a chance.—Peter Witt.

goods and services we might enjoy if we could do a better job of it. The great opportunity for advance in living standards, according to Department of Commerce officials, lies in the steady elimination of these wastes.

Of course, the automotive industry is interested in advancing our living standards. The automobile has done much in developing a higher standard of living. It has placed the great out-of-doors within the reach of the city dwellers and has brought the farmer into intimate contact with the city advantages.

It was the automobile manufacturers who developed high efficiency methods by means of quantity production. And now it is recognized that Henry Ford eliminated an immense loss due to labor turn-over and labor conflicts when several years ago he inaugurated the plan of a \$5 a day minimum wage.

While improvement can be made in eliminating waste in the automotive industry, it undoubtedly ranks high as to efficiency when compared with other industries.

Service Builds Business.

"Whenever I motor east of Chicago, I always arrange to stop over night in —, Ind.," said a seasoned motorist to us the other day. And he spoke so enthusiastically that we wanted to know the reasons for his preference for that particular city.

It was based entirely upon garage service! Early in the season he was returning to Chicago by motor from Buffalo. It had been rainy and the roads were very muddy. When about a mile outside of this particular city, his front axle broke and the steering gear was disarranged.

He telephoned to a garage in the city and a wrecking car was sent out to him. While his car was being fixed up, the garage proprietor made the time appear short by his courtesy and evident desire to make things pleasant for him. The car was washed, a new axle put in, the steering gear straightened, the car greased and oiled, and a supply of gasoline provided.

Naturally, the motorist expected a very large bill, but, to his surprise, it was most moderate—and he knew that he had received exceptional service compared with service rendered him at other garages.

This particular garage specializes in service, and it makes such an impression upon patrons that they cheerfully pay the charges and consider them extremely reasonable. This Chicago man is a strong booster for that garage in that particular Indiana city—and he will go out of his way to stop at that place in order to patronize it. Further, he tells all his friends about the exceptional service it renders so that they, if motoring in Indiana, are most likely to visit that garage.

So again service makes friends and builds a reputation which is more than a local one. During the tourist season, such a reputation is indeed one that is decidedly worth having. This Indiana garageman is building for the future and he is of the type of garagemen who endure and prosper regardless of business fluctuations.

Business Is Better Here—No Wonder!

The "Greatness of Little Things" Is Well Illustrated in This Story of a Pennsylvania Garageman—Careful Attention to Details, Conveniences, Neatness, and Prompt Service Characterize His Busy Establishment

By K. H. Lansing

"Business is getting better all the time," says Charles W. Pierson, proprietor of Pierson's Garage, of Media, Pa. He is planning many alterations and improvements for his two large brick buildings, one of which is his main garage, repairshop and service building and the other—formerly an agency and a really handsome structure—principally devoted to storage purposes.

A reason for Pierson's increasing business is seen on examining his buildings, equipment and methods. Media is a small place, but it numbers among its inhabitants many wealthy and "well-to-do" families, no small proportion of which are daily furnishing custom for Pierson. "Ours is a high-grade clientele," says Pierson, "and we have to keep things right, here."

Proverbial "pin-like" neatness prevails throughout both buildings, extending to the front, rear and sides. There is "a place for everything, and everything in its place"—no wild groping for any article to be sold, or automotive part to be used. The employees—no less than twenty of them—are quick, obliging and expert in their several lines of work.

Convenience and accessibility are strong points in these buildings. For instance, in the main garage, right up in front facing the entrance, and located where the customer can be served immediately, is a notable battery of seven white-enameled lubricating oil tanks with pumps.

No need to run back far into the garage, or dodge about and keep the customer waiting. No "slopped" tanks or cans—a woman in white may pass by here and not have a garment so much as flecked or specked by a drop of oil or grease.

Several customers can be served without one having to wait for the other. The garage employs plenty of men for just such emergencies and—what is more—it has the facilities. A large tube leak-testing pan occupies a conspicuous position near the lubricating oil tanks.

It is a fact that most motorists do

They call again and tell others about the service. These may seem to be small things—convenience, accessibility, neatness and speed, but they have counted heavily in the success of Pierson's Garage.

To the garageman who is apt to say, "Why this is nothing new. It's old stuff." "I've known it all along," the

answer is: "That may be, but have you and your men been *doing* these things?" It isn't that they're simple. It's whether they're done at all.

In a city like New York, filled with bakeries, how many men would have felt like opening another one—to make a fortune? Yet Ward of Brooklyn, did so and fortune came to him because he actually did the things and

made the improvements that others had merely dreamed of and talked about.

What he sold was just bread, to be sure; but the processes were better and quicker and the product more perfect than most of its predecessors on that account, and so its fame spread and Ward made money. There's no use "pooh-poohing" at the *A, B, C's* of anything because they are the *A, B, C's* and are known to everybody. The one who tries to read without learning them will make a sorry mess of it.

Pierson's main garage building has a "drive-in" on the right-hand side, and this leads the customer directly in front of the well-stocked accessory department, where there is a good display in showcases and on the counters.

He keeps a stock of accessories on hand, worth, on an average, about \$37,000. He sells Federal and Good-year tires and tubes, and his average stock of these is valued at \$2,500.

He repairs and vulcanizes tubes, but no shoes. Should a customer desire a



Proverbial "Pin-Like" Neatness Is Characteristic of Both Inside and Outside of the Pierson Garage, Media, Pa.

not seem to discover that they need oil for their cars till the last moment, or until there is immediate danger of burned metal—then, of course, they are in a hurry.

It is also almost axiomatic that, when a motorist requires a tire taken off and put on, or needs a new tire,

PIERSON'S DEPARTMENTS.

Passenger car and truck storage.

Battery sales and repairs.

Tire sales and repairs on tubes.

Machine-shop repairs, and adjustments on cars and trucks.

Accessory sales.

Ford and general parts.

Authorized Ford service station.

haste is the dominant factor. So this garage has a Weaver press-on pneumatic tire machine right up in front, near the location of the oil tanks.

One of the quickest men in the shop presides over this, and customers fully appreciate the speed and neatness with which these things are accomplished.

shoe vulcanized, or otherwise repaired, Pierson would send it to a reliable concern which specializes in this work and always accommodates him.

The main garage building is three stories high. On the first floor, which

ular order of assembly of a Ford car—from front to rear. In the general parts section, the units are placed, for the most part, in the order of the catalog Pierson uses.

There are revolving pyramids to dis-

tions will be made to the building, giving it a depth of about 180 feet. Between the two buildings, Pierson plans to construct a women's rest-room, attractively furnished.

The former agency building, now used chiefly for storing passenger cars and trucks—each in a separate division—is 90 feet by 48 feet and is two stories in height, with an attractive front of brown brick and light stone. It affords storage space for 80 cars.

Pierson believes in having garage forms as simple as possible. Formerly he employed a card index system for repairs, but he has scrapped it and asserts he obtains more favorable results through using a plain slip, 8 by 5½ inches.

This slip bears the name and address of the customer, the description and number of his car, spaces for the itemized repairs to be written in, with cost of each item in columns at the right, the repair order number and these warnings: "Cars driven by our men at owner's risk," and "Cars left over ten days after finished, will be put in storage." These precautions are a matter of protection. At the bottom of the slip, is this wording:

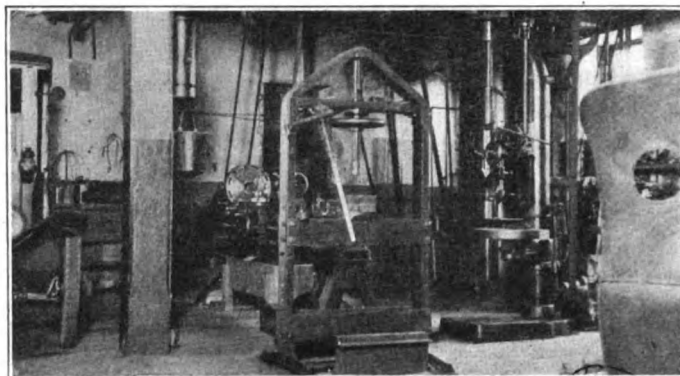
"When job is completed notify Mr.

.....
"Address Phone No."

At the top of the slip, of course, appear the name, address and telephone number of the garage and the designation of the form: "Repair Card."

The garage foreman—who is made positively responsible for the satisfactory fulfillment of the work under his charge—receives each morning, or during the day, duplicate copies of the re-

Lathe, 22-Inch
Drill Press and
Arbor Press Aid
In Making Pier-
son's Repair-
shop a Leader.



is 100 by 48 feet, are the service and repairshops and the office, in addition to the tire and accessory sales department.

The machine, or repairshop, occupies a considerable space in the rear of the first floor. Here are a large lathe, a 22-inch drill press, an arbor press, a forge, small, portable electric drills and various other articles of equipment which make this the leading repairshop in Media. Even rears and frames are straightened here. Commercial cars as well as passenger cars are repaired here.

There is a small battery department, for Pierson is an agent for a battery, does recharging and makes repairs.

No one can pass Pierson's place of business without knowing for what he is in business. In addition to the large gasoline tanks in front, and facilities for supplying air, Pierson has large signs—especially on his main garage building—that announce his line for a considerable distance. One of these signs is illuminated at night.

His two service cars, with special open bodies, are conspicuous advertisements, being painted yellow and black and bearing Pierson's name, street address and telephone number. These cars are used for everything, from salvaging and towing wrecks to delivering tires and accessories.

The second floor front of the garage building is rented as a dwelling and the rear serves as a department for Ford and general parts. Pierson's is an authorized Ford service station.

This stockroom is a model of neatness. The Ford parts have a separate division and are arranged in the reg-

ular order of assembly of a Ford car—from front to rear. In the general parts section, the units are placed, for the most part, in the order of the catalog Pierson uses.

PIERSON'S CARDINAL PRINCIPLES.

Absolute neatness—if you're not a good housekeeper, you cannot work for him.

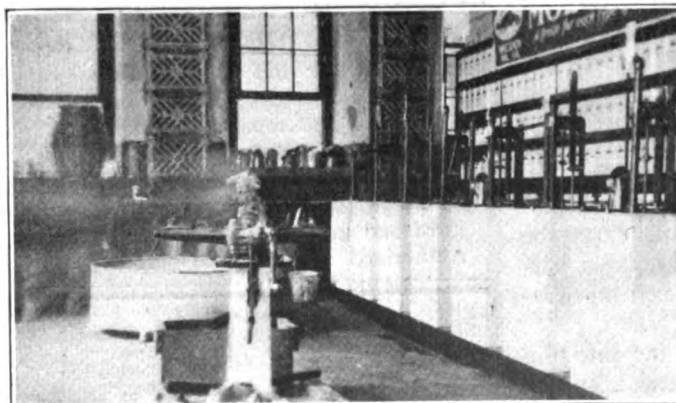
Efficiency—which includes expert workmen, the best equipment obtainable and accessibility thereto.

Speed in accomplishing satisfactory work.

Note: His business is big and increasing rapidly—above are reasons.

parts, and he asserts this end of the business is constantly increasing.

"My gross sales last year were approximately \$150,000," said Pierson.



Pierson's Stock
Room is a
Model for Neat-
ness and Sys-
tematic Ar-
rangement of
Stock.

The third floor, which is at present a hall—rented to any desirable person or organization—is soon to be remodeled into a paint and trimming shop for Pierson's business. Later, addi-

pair order, the original of which is retained in Pierson's office.

The duplicate is hung on a special hook near the shop entrance. The foreman takes it off, notes the various

Does All-Tire-Accessory Store Pay?

This Ohio Dealer Found That It Did—"Can't Be Done in a Small Town" Said His Neighbors, But His Courage and Good Judgment Blazed the Trail to Real Success—Offers a Thoroughly Stimulating Example for Doubters

By C. M. Adams

"Oh yes, your theory is all right. The tire and accessory game is a big one, and I know it has to be handled as a business of itself in order to get all the profit there is out of it. But—"

The man, who had been soliciting suggestions for opportunities in the automotive dealer field, shook his head slowly with an expression that registered deep, dark doubt.

"I'm afraid you are all wrong about the small town being the place for a business of that sort. It seems to me the city's the place—the only place at all, in fact," he concluded.

This is what a good many automotive men think—the same men who have been the first to see the possibilities of the tire and accessory business, and the first to advocate conducting it as a distinct enterprise separate from a garage or service station.

And that is why the story of Frank M. Booso, of Milford, Ohio, should prove interesting, for Booso is an automotive dealer who not only thinks a tire and accessory store will pay in a small town, but has proved that he thinks straight by going out and making one pay. Here is Booso's story:

Milford is a town of a little more than 1,600 inhabitants in the Little Miami valley, some 15 miles north-east of Cincinnati and located in a community which is part farming and part suburban. It is Booso's home town.

Since the days of the first sneezing side-crankers, he has been interested in the automotive industry. He was one of the first car owners in his town and soon afterward became one of the first agents.

Later, when cars had ceased to be a thrilling novelty, he was associated with other men in a sales and service garage enterprise. Almost from the beginning, he recognized that the tire and accessory end of the business had big possibilities.

Withdrawing from the sales and service garage, he added a stock of tires and accessories to the sporting goods and novelty business he was

conducting. This stock grew. He added a filling station, the agency for a car or two, and his business grew until he had a good share of the total business being done in his territory. Still he was not satisfied.

He saw that he could not develop his business to its full possibilities until he handled it in a store devoted primarily to it, and so, late in the sum-



Booso's Establishment, Milford, Ohio, Specializes in Tires and Automobile Accessories.

mer of 1919, he took the final plunge.

"Why, man, are you crazy?" "You'll never get by on just tires and accessories." "I thought you had better sense than that." "Nice way to drop some perfectly good money." "You can put that over in a city, but not in a small town."

These were some of the candid, if not considerate, remarks made by self-appointed "business experts." But he went straight ahead.

He purchased property well located on the town's main street, tore out the old-fashioned front, and installed a new front of steel and plate-glass that would afford a maximum of display space, re-arranged and re-decorated the interior, put in two gasoline tanks, bought stock, and opened for business.

On the surface of things, his prospects were not flattering. Locally, he had to meet the competition of two garages, a hardware store, a tire repair-shop, and several free lance agents—all handling tires and accessories.

The farming community was, of course, being deluged with mail order advertising, and every man of the many in the community who commuted daily to Cincinnati was a potential customer of the big supply stores in the city.

But his business has grown steadily and healthily because he has had the courage and good judgment to devote his merchandising efforts exclusively to tires and accessories.

First of all, he has been able to carry an ample stock. Instead of having the greater share of his investment tied up in cars or some other major merchandise, with only a small amount left for tires and accessories—as would be the case if these were merely a sideline—he can put every dollar of working capital into stock.

The result is that he has such a wide range of styles and sizes that "I'm sorry, but I don't keep that" is an answer he seldom has to make and, when some particular item is called for that he chances not to have in stock, he can procure it speedily because of the connections he has formed with jobbers and wholesalers.

Next, he can devote his entire display space and time to tires and accessories. He does not have to push back a stack of tires into an obscure corner, or stop talking to a live battery prospect because he feels compelled to turn to other goods. These are the goods he has to sell and he can utilize every inch of window and showcase and every minute of time in pushing them without neglecting anything more important.

"This business is just like any other," he said. "A man who wanted to sell groceries wouldn't think he was going at it right if he put them in as a sideline to hardware, and a man who wants to sell tires and accessories and

The reader will note the two charges to merchandise—carriage and invoice.

Convenient Purchase Order Form Made in Duplicate Same as Sales Ticket.

Very often only one column is used for both items, the transportation, or carriage, and the invoice being added together before being posted to the journal. This is simplified by placing a receiving stamp on each invoice when received. It is then a very easy matter to transfer to the invoice all the important data on the expense bill.

The most convenient purchase order is the same size as the standard sales
(Concluded on page 17.)

The Right-Hand Side of the Purchase Journal is Intended Merely for Departmentizing Purchases.

Pike Citty Has a Mooses Convension

Theys a Convension Here This Week of Elks or Mooses or Sumthing and of Course About a Millyun Cars Wanted to Get in Heckers Garage—The Boss Took Care of All Cars and Saw That the Convensioners Got Service With a Big S

By Frank Farrington

Deer Pete:

Sallyratus is heer to work now. Sheez our new stenografer you kno and sheed kill me if she new I rote about her and calld her Sallyratus insted of her name wich is Sally Rader. The only trubbel is that the fellers is wize to me and they aint much chanse to hang around the offis enny becaws soon I get in there, sumbody hollers for me to get sumthing or do sumthing. I gess they got it all put up. Woodent that make you tired?

Theys a convension here this week, elks or mooses or camels or sumthing. Pike citty was all lit up last nite like a munissipel peer. Youd think the elks or mooses or camels are produgal suns and they was going to kill the fat calf but Polo says theyre only shootin the bull, whatever he means by that.

So of coarse there was a millyun cars wanted to get into this garaje and Persy says "Why dont you charj em twice as much and make a littel sumthing on em. Youll never see em agen."

Thats about Persys speed. Heed profiteer on his granmothers funeril if he got a chanse. The boss said: "Youll never get very far in bilding up a bizness for yourself Persy if you start in on the base of charjing all the traffick will bare.

"Theez fellers thats heer elking or moosing will be tooring this way sum day, if they liv so far off they dont get heer enny other times, and if I jack up the price on em now, are they going to cum to this garaje next time? Nix, they are not.

"Even if youre never going to see a feller agen, giv him your best servis and your regguler price and make him

a booster for your place. Sum of his frends is likely to ask him, 'Pike citty? Ever bin there? Kno wich is a good garaje?'

"That where sum feller is going to get advised to cum to your place or else heez going to be told to pass you by. If I can make every one of theez fellers that cumes in heer go away reckommending Heckers garaje to

aint so worse, Ile tell the world. He went to the hed of the convension bizness and told him:

"Say, a hole lot of cars is cumming to this convension and moren the garajes can take care of. Why dont you get all theez fellers that keeps their cars in our garajes regguler to see if they cant squeeze em into frends privit garajes around town just for

the convension days soze weel all hav more room and can take care of the outsiders and giv em servis so theyll hav a better time and etc."

The convension did it too and so theez outside fellers cood all get their cars into garajes and not haf to stick em in to privit garajes and barns all around. Then eech feller that giv up his garaje space for the time, sum mooser got his storage by that fellers curtesy and the garaje man

wood tell him so, but of coarse he paid just the same.

The boss is alwys rite around on the job himself when theres ennything like this convension crowd. When we hav a lot of peepel cumming in and going out the boss mixes rite in with them and runs things and leeves it to Persy and the stenog (you kno who now) to do the offis work.

I gess heez rite at that becaws even a feller like Persy can mebbly keep books pretty fair and even a green stenografer—well not green like you think, but green about our offis—can work at her job wile the boss issent rite there. So whats the use of the boss doing work in the offis Persy and sweet patootie can do when he mite better be out there getting ackwainted with all those automobileelers and making em feel good and seeing they get



Spike Had Sum Big Round Tags Made That Red: "Pike Citty Mooses Convension, 1921," "Heckers Garage," and Put One on Each Car.

their frends, thats all I ask of em. Ime satisfied with my regguler proffit."

Spike had a skeem heed fixt up and I gess he haddent even askt the boss about it becaws when it was time to get it reddy the boss was away. Spike had sum big round tags made with the colors of this convension on end and they red "Pike Citty Mooses Convension 1921" and in little letters he had under that "Heckers Garaje."

You see the tag was a kind of sooveneer that shode where a feller had bin and Spike put one on eech car when the feller went away and they made a good hit becaws every feller had had such a good time he wanted to sho heed bin to the convension. The boss pattid Spike on the back pretty good for that idee.

Ile tell you anuther thing Spike did. That feller is alwys getting idees that

servis with a big S so theyll want to cum back agen.

Why sum of those convenshoners was calling the boss "Heck" by the seckond day they was heer and invit-ing him to cum and make em a vizzit, and he wasn't doing their work or storing their cars for nothing eether. But you kno how it is, Pete, sum places where you do bizness they make you feel theyre your frend and sum other places they make you feel theyre just after your munny and all they can get of it. Aint it so?

Ive herd the boss say he thinks enny bizness man is worth more to his biz-ness on the job where he meets cus-tomers and makes em frends and sees they get tretted rite than he is back in a ofis: sumwhere or in a stock room doing things a 15 dollers a week girl cood do well enuf.

The boss is a grate hand for systems. He wants things put where anybody in the shop that ever new where they belonged can find em again. He dont change around the way the parts is put away. Theyre alwys in the same pew and if they aint there, they aint enny. Yes, and thats what got Chick balld out one day. You tell em!

Chick thawt the bin neerest the dore was the handiest place to keep one kind of grees cups and that bin was emty and he put the new lot rite in there. He diddent say ennything to ennybody and then the regguler grees cup bin got emty and sum customers diddent get em when they wanted em becaws Chick wassent around when they asket for em.

The boss herd Bob tell a man he was sorry but we diddent hav one of those grees cups in the place, and the boss new a lot had cum in and he wanted to kno what becum of em. Nobody new until we happend to find em. Then he found Chick had put em in the rong place and buleev me the grees cups wassent all that was in rong. He giv Chick an eerful of talk about how to put stock away that must hav made sum dent in Chicks eerpan. So nobody around this ranch changes locations of ennything without the boss oks the change and then every-body gets told about it. We aint sup-posed to have to waste enny time look-ing for things where they aint. How about it in the drug bizness Pete? Is the bottel of CCs rite where you and the boss both kno where it is?

Rite soon old aqwie Vighty.

Your old collij chumb, BILL.

PENLINGS FROM THE PEN OF DIKE.

An old man once said to me: "What they say is a d— lie!" That old man's remark is right as many times as Ivory soap is pure—and that's ninety-nine.

The old saying is: "You can't make a silk purse out of a sow's ear." Neither can you sell gyp tires and make folks come back for more.

If you give the tire customers your war tax, you are giving them 5 per cent to trade with you.

Lots of this unemployment is caused by people not wanting to do real work.

The frost will soon be on the pumpkin. Now is the time to push the sale of enclosed cars.

Some garagemen are like bears. At the first sign of Winter, they crawl inside their holes and wait till Spring. Don't be a bear.—Be a wolf and keep prowling in the advertising game and watch the Winter business come in.

Show me a dealer who keeps smiling—and I will show you a suc-cessful dealer.

Many a rose is born to blush unseen. Lots of automotive stores are born to blush unseen. The reason is that they don't advertise and they die faster than the rose withers.

October is the month of falling leaves. Also the falling off of tourist business. Now is the time to advertise Winter accessories.

He that advertises today will live to advertise another day.

An optimist is a car dealer who can see all the good qualities in his competitor's car—and a few more in his own.

Wouldn't it be fun to have these high-brow office guys in the auto-motive factories try to run a garage? Oh, aren't we glad the factories have them! If they didn't, the garageman wouldn't have anything to throw in his waste basket.

Lots of folks get a grouch on by looking at some one who always wears a grouch. Don't wear a grouch, because it's as contagious as the measles.

Just because the flies are gone is no sign not to change the windows every week.

A nice line of motor robes, rightly displayed, will sell as fast as hot cakes at a country fair.

BUSINESS IS BETTER HERE, NO WONDER!

(Concluded from page 12.)

items for work, checks off each as the job is completed and, when everything on the repair card has been finished, returns it, with every item checked, to the office, where it is filed.

In seeking customers, Pierson sends out circulars, being careful to get the latest address in each instance; and he also sends out, from time to time, postcards announcing graphically what he has in stock. There is no special time for the issuance of these remind-ers, except at the beginning of a sea-son. They may be mailed any time Pierson wants more customers.

GARAGE ACCOUNTING

(Concluded from page 15.)

ticket—4¾ ins. by 7 ins. torn out. These are made in duplicate the same as the sales ticket. The form illus-trated has received no serious criti-

cism so far. It is economical and con-venient.

If any of our readers should have different forms for these purposes, we shall be pleased to have them pass them on so that judgment may be passed upon them. Progress is most-ly the exchange of ideas. Send in some of your forms to the AMERICAN GARAGE & AUTO DEALER.

Quiz Questions on Garage Ac-counting.

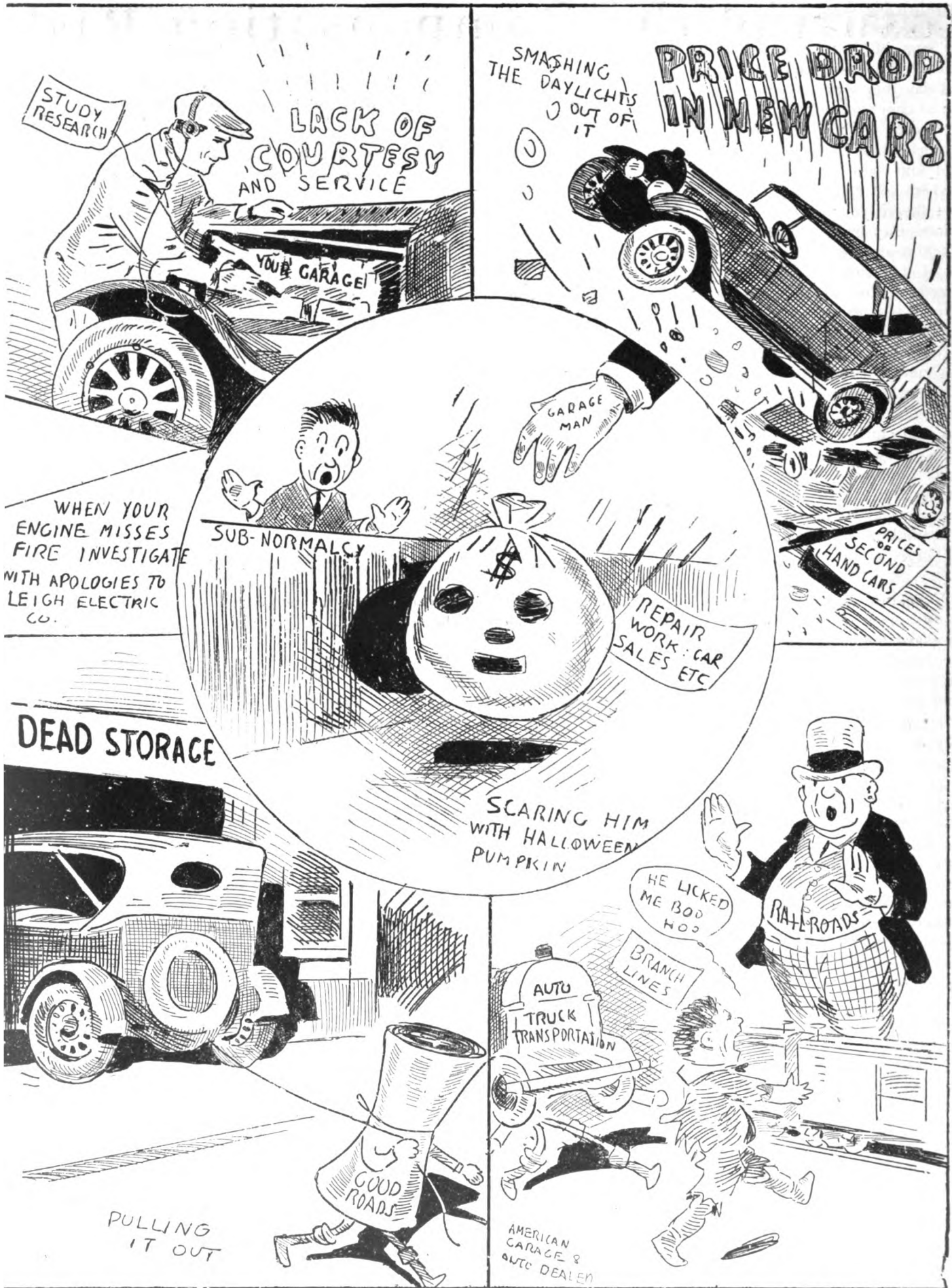
What advantages does the pur-chase ledger offer as compared with the voucher system?

How is a "maturity tickler" kept and what is its purpose?

What is the meaning of the term "carriage" as used in garage ac-counting?

Name the items necessary for re-cording in a complete purchasing system.

What is the value of such a sys-tem?



Insuring the Compensation Risk

Burden Imposed Upon Employers by Compensation Risk System May Be Somewhat Lessened by Insurance—Many Forms of Compensation Insurance Available—Brief Summary of Laws Governing Mutual Insurance Associations

By Chesla C. Sherlock

In past discussions in *THE AMERICAN GARAGE & AUTO DEALER* we have brought out the fact that the employer of labor has a very definite compensation risk and that, under the law, it is a risk which may be insured.

This is a very valuable feature, for it enables the careful employer to relieve himself to a very large extent of the heavy burden otherwise imposed upon him by the compensation system. It enables him to get out from under the great risk of financial ruin in case a catastrophe should occur in his shop, in the first instance, and it enables him to determine the cost to the last penny so that he can pass it on to the ultimate consumer, in the second instance.

How can the employer insure himself against this risk? There are many forms of compensation insurance available. In the United States, we have three forms of insurance which are officially recognized by the respective statutes as being permissible under the compensation acts.

These forms are: (1) State fund; (2) private corporations doing a general casualty business; and (3) mutual insurance companies or associations organized by the employers themselves for the purpose of carrying out their liability under the compensation acts.

Most employers are familiar with the private stock-company form of insurance. They have bought insurance of this kind in other lines at some time or other. These companies are organized for profit and take a profit on the business transacted, just as other corporations conduct other businesses for profit. The state-fund form of insurance is merely insurance carried on at cost by the state for the purpose of guaranteeing compensation payments. Not all of the states have this form, Ohio being one of the best-known.

Mutual companies are also more or less familiar to employers. They have entered business in almost every line of insurance for the primary purpose of saving premium cost and transacting the business at cost. In many re-

spects, the mutual idea is attractive, while in others it is not at all favored by those who deny its right to enter fields where they are at present engaged for profit.

The law has never denied employers the right to form these associations and the validity of mutual compensation insurance is recognized in every state, provided the insurance laws have been complied with.

It will be necessary, in organizing one of these mutual insurance associations, to examine the law in the state in which it is proposed to do business. In California, the law requires at least five incorporators and at least five and not more than 11 directors. There must be at least 100 subscribers representing at least an aggregate of 1,000 employees before the association can commence business. The corporation may endure for a period of 50 years and the premium ratings are to be fixed by the workmen's compensation rating bureau of the state.

Colorado requires at least 15 employers and the association cannot commence business until there are at least 20 employers in the company representing 2,500 employees. The directors have the power to fix the premium rates and may discriminate in favor of some employments and charge higher rates for others.

At least 20 persons are required in Illinois to form a mutual association and may commence business at any time when 20 policies have been issued to 20 members, covering the same kind of insurance and representing not less than 200 separate risks.

No maximum single risk is permitted to exceed 20 per cent of the admitted assets, three times the average policy or one per cent of the insurance in force, whichever is the greater. Admitted assets are not required to exceed \$25,000 and not less than 1,500 employees are to be covered, each employee being considered as a single risk.

Policy holders are required to be members of the company. Twenty persons are required in Indiana and

the other provisions of this law are similar to those of Illinois. The Kentucky law is also practically identical with that of Illinois.

In Maryland, there must be at least nine directors and 20 subscribers with 2,000 employees before business can be commenced. Ten or more persons may form a mutual association in Massachusetts, but no policy can be issued until applications for at least \$50,000 worth of insurance have been received, or applications by 100 employers having not less than 10,000 employees, or applications by 50 employers having not less than 5,000 employees, and each employer must obligate himself in amount not to exceed five times the amount of his cash premium, which may be called for in the emergency.

Five incorporators may form such an association in Michigan, but they must represent at least 5,000 employees. The life of the corporation is limited to 30 years. According to the law of this state any mutual company may write liability insurance if possessed of net cash assets in an amount of \$500,000 or over.

Twenty incorporators are required in Minnesota and business may be commenced when at least 5,000 employees are covered. Twenty employers representing 5,000 employees are required in Nebraska and when once issued the charter may be perpetual. A similar requirement is made in New Hampshire. The Oklahoma law is identical with the Illinois act.

Pennsylvania requires 20 employers representing 5,000 employees who have accepted the elective compensation system but, where the employers represent agricultural pursuits, at least 200 are required. In other respects the statute resembles that of New Hampshire. Texas requires 75 employers representing 2,000 employees and \$10,000 must be deposited as a reserve fund. There must be at least \$500,000 worth of insurance contracts before business can be commenced and no employer can assume a risk of more than 10 per cent of his net worth.

Testing and Repairing the Magneto

Action and Characteristics of Generation of Electric Current—Testing Magnets for Polarity—Methods for Testing Outlined and Illustrated—Locating and Correcting Trouble in Condenser—Article Copyrighted and Published by Permission

By L. R. Van Valkenburg
Service Engineer, Avery Co.

In taking up the subject of testing and repairing of magnetos, it will be necessary to make a few explanations regarding the generating of electric current, its action and characteristics, as it is absolutely necessary to understand these things in a gen-

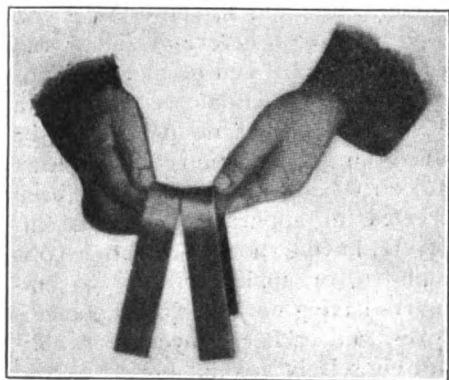


Fig. 1—Testing Magnets for Polarity.

eral way before it is possible for the layman to grasp the performance of a magneto.

This subject is seemingly a complicated one and the average novice throws up his hands in holy horror whenever you mention to him that he should be able to test and repair his ignition system.

The facts of the matter are that the magneto is a very simple instrument and any person who is mechanically inclined at all, who will give the subject a little careful study, will find that he can very quickly learn the few essential things that are necessary for him to know in order to intelligently find his trouble and correct it.

The first lesson to learn is that a magneto does not manufacture electricity. Electricity is in everything at all times. The only thing a magneto or a dynamo can do is to put this electricity under pressure so that if a metal path is established between the two ends of the coil of wire which is in the armature, this pressure will put the electricity into motion or permit it to flow. It is not necessary to go into a technical discussion but there are certain things which must be clearly understood.

One must understand that it is the action of the magnetic force from the magnets upon the armature wire that causes the electricity to flow. A magneto is in reality an electric pump, the magnetism performing the same function as the leathers on a pump piston. If your magnetism is gone, you get no flow of current; if your leathers are gone from your pump, you get no flow of water. So the first test to

be made is to determine if the magnets are still reasonably strong.

This can be done by revolving the armature shaft with the thumb and fingers, noting carefully if there is a resistance at certain intervals which tends to stop the rotating of the shaft and then tends to increase it. In other words, a magneto with good magnets should show the same characteristics when the armature is revolved as a motor with good compression.

If there is no resistance offered to the rotation of the shaft, there is one of two things wrong: Either the magnets are weak or one or more of them have been reversed or put on in the opposite position.

The ends of the magnets are opposite in character. When they are assembled on

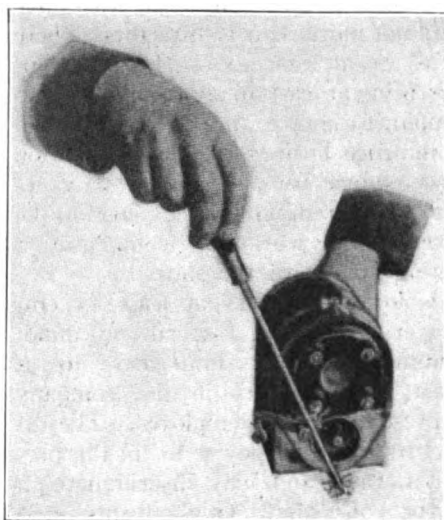


Fig. 2—Testing the Low-Tension Circuit.

the magneto, they go to make up one large magnet and, for this reason, the alike poles should all be on one side. If one magnet is reversed, its effort will be to cause the electricity to flow in one direction while the efforts of the other two will be to cause it to flow in the opposite direction. Consequently, if three bars are used, you will only get the force of one magnet as the force of the other two will be neutralized.

Magnets can be tested for polarity in several different ways. First, if they are examined closely, one will find on nearly every make of magnet that the poles have been marked either with paint or with a stamp, or in some cases a spot is ground on the end of the bar. This, however, is not a true indication of polarity as it oftentimes happens that someone has tampered with the instrument. The writer has found a good many cases where inexperienced

people had attempted to recharge magnets and reversed the polarity. In this case the marking is worthless and resort must be made to a more accurate test.

A small pocket compass is a very convenient and accurate method of testing. Before assembling the magnets on the magneto, simply take up one magnet, hold it to the compass and note which end of the needle is attracted by a certain end of the magnet. (One end of the magnet will attract one end of the needle and the opposite end, the opposite end of the needle.) Place this magnet on the magneto.

Pick up the second magnet and turn it until it attracts the same end of the needle that the first one did, then place it on the magneto frame with the marked end next to the marked end of the first magnet. Continue to do this until the magnets are all assembled, with the poles of the same polarity all on the same side.

A more convenient way, however—one that is absolutely positive and where no instrument at all is needed for the test, is to pick two magnets up, supporting them on the index fingers and bring them together, as in Fig. 1. If the ends of the magnets are attracted to each other, reverse one. In this position it will be found that they will not be attracted but will push each other apart.

This is the position in which they should be assembled on the magneto. Place one magnet on the frame, being careful to note which way it goes on, still retaining the other magnet in the hand. Bring the third magnet up to this magnet and turn it until the ends push each other apart and assemble on the magneto in this manner.

After determining the condition of the magnets, if they are found weak they will

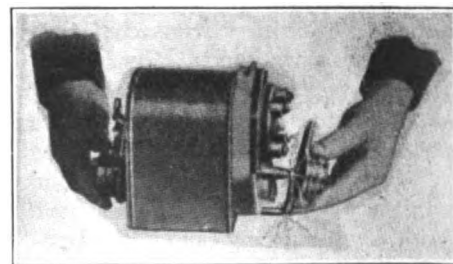


Fig. 3—Testing the Breaker Box.

have to be recharged. If they are found O. K., the next test to be made is to test the low-tension circuit which includes the armature coil and wire leading out to the breaker box.

This can best be done by removing the breaker box and holding a screwdriver—one with a wooden handle—in position, as shown in Fig. 2. It will be noted that one end of the coil of wire on the armature is fastened to the frame of the magneto by a ground-

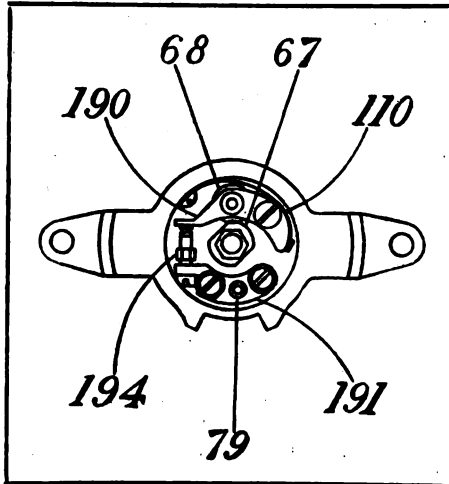


Fig. 4—Electricity Flows to Platinum Points Through Pin No. 79.

ing screw—or if it is a shuttle-wound armature, it will be fastened to the armature itself—the opposite end being brought out and connected to the breaker box. By touching this end of the wire with the screwdriver and at the same time bringing the screwdriver in contact with the frame of the machine, a complete metal path will be established.

If the magneto armature is revolved, or rocked back and forth by the point where the most resistance to the revolving of the shaft is felt, the electricity will be forced to flow through the screwdriver, and if the screwdriver is slid back and forth gently, it will break the circuit enough to show sparks where it comes in contact with the frame of the machine. If the sparks are seen, this is an absolute proof that the low-tension winding is perfect.

On the other hand, if you cannot obtain any sparks in this way, the circuit is either open or there is a short circuit. It may be that the insulation on the wire where it is brought out through the side of the instrument, is worn off so that the wire comes in contact with the side of the opening, causing a short circuit. By looking this over carefully, you will be able to locate it.

In the inductor type of magneto, such as the K-W and Remy, it will likely be at the grounding screw where the wire is fastened to the side of the instrument. On the shuttle-wound type, such as the Bosch, Eiseman, Kingston, etc., the break may be at the point at which the wire is fastened to the armature or to the collector ring. It is practically impossible for the wire to break in the coil.

After determining the condition of the low-tension circuit and repairing, if necessary, the next step is to test the breaker box. Now, the breaker box has just two jobs to do. First, the platinum points are allowed to come together; this being the only break in the metal path, the circuit is completed. When the armature turns over, the electricity is allowed to flow in a circuit through the coil.

At the proper time, these platinum points must be forced apart, thus breaking the circuit and stopping the flow of electricity in this coil. This action generates a very powerful current on the secondary or high-tension winding of the coil which flows through the gap in the spark-plug and ignites the charge in the motor cylinder. Therefore, the breaker box first makes a circuit and then breaks it.

The breaker box can be tested in the manner illustrated in Fig. 3. The current flows to the platinum points through pin No. 79 shown in Fig. 4, to the block which supports one of the platinum points. This block, being separated from the rest of the breaker box by insulating washers, the electricity cannot flow to the side of the breaker box except through the platinum points. Also, if the platinum points are dirty, or do not come together, current will not flow, as the voltage is not high enough to overcome the resistance.

So by placing pin No. 79 against the low-tension lead (Fig. 3) and bringing the shell of the breaker box or arm in contact with the side of the magneto at any point, current will flow through the platinum points to the grounding or side of the magneto frame, completing the circuit through the platinum points. However, if the platinum points are dirty, the current

The current might be flowing through at some point other than the platinum points. Consequently, it is necessary to separate the points by placing a small piece of good firm paper between them and make this test over again.

Upon making the second test, if sparks

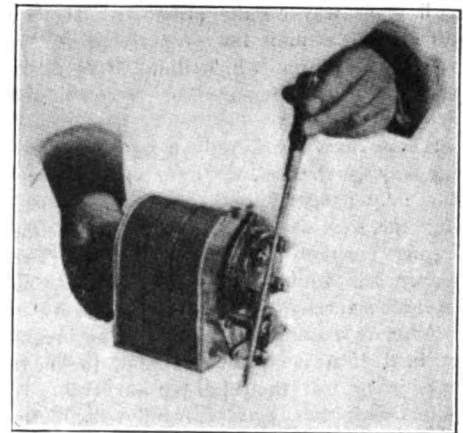


Fig. 5—Place Screwdriver Across the High Tension Circuit.

are obtained, the insulation is back on the block which holds the stationary platinum point and will have to be renewed. However, it sometimes occurs that this block will be short-circuited by metallic dust or cuttings, from some part which is wearing, forming across the insulating material. When this is the case, simply dip the breaker box in a dish of kerosene or gasoline and shake it vigorously, which will wash it out clean and remove the trouble.

The next test is to place the breaker box in position, turning the armature shaft over until the roller in the breaker arm is in the low part of the cam. Now, observe if the points come together squarely and that there is a little clearance between the roller and the cam. Revolve the armature shaft and observe how far the points are forced apart.

This distance should be 1/64-inch or the thickness of the gage sent with each instrument. If this distance is wrong, it can be corrected by adjusting the stationary platinum point screw by loosening the locknut and turning the screw to the right or left, whichever the case may need. After adjusting the screw, it is always necessary to re-dress the points.

This is done by using a platinum point file, placed between the points. One should draw the file as nearly straight as possible so as not to file the points rounding. Care should be exercised not to file the points any more than necessary as platinum is worth several times as much as gold and every particle filed off means a shortening of the life of the point.

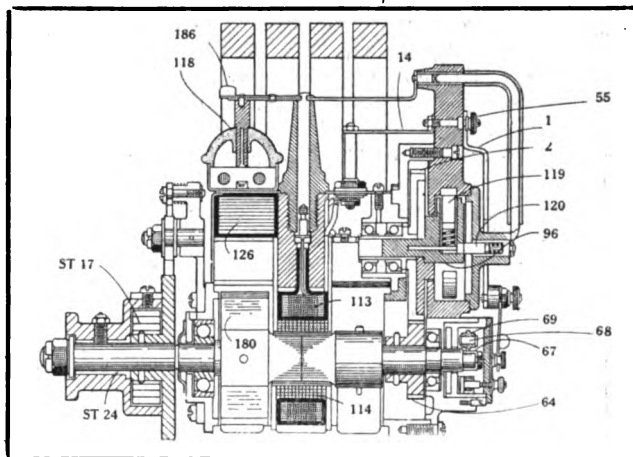


Fig. 6—High-Tension Wire Comes Up Through Pillar of Hard Rubber.

will not flow, and this is the test to use:

Holding the box in the position shown in Fig. 3, revolve the armature, rock the box lightly so that the part touching the side of the magneto frame will move gently. At this point sparks will be generated, and if so, they prove that the circuit is complete through the breaker box. This is only half of the test, however.

It is also necessary to observe if the points are forced apart at the proper time. To do this place the breaker box in the full advance position, turn the armature over in the direction in which it is intended to rotate, turning very slowly, and note if the points separate just after the pull gives way on the armature. If they do not, the cam is not properly timed. By removing the nut which holds it in place, the cam can be removed or turned in the proper position.

These cams are keyed on but sometimes the key is sheared, or some careless person may have taken the cam off, loosening the key and placing it back in the wrong position or wrong side out. The writer has found this to be the case in many instances.

After correcting the trouble in the breaker box, if any has been found, the next step is to test the high-tension coil. If your work has been carefully done, by placing the breaker box in its position and revolving the armature shaft, placing a screwdriver across the high tension circuit, as shown in Fig. 5—allowing the end of the screwdriver to come within about $\frac{1}{8}$ -inch of the high-tension distributor arm—it will be found that the current will flow across this gap, showing a bright spark.

If it does not show a bright spark, the trouble is absolutely in the high-tension winding or insulations.

In making the high-tension test, it is best always to remove the distributor box cover so as to eliminate any possibility of a short-circuit in the cover. If a spark is obtained from the distributor arm to the frame of the machine, by using the screwdriver, but one cannot be obtained at the spark-plug cable binding posts, the trouble is in the distributor box itself.

This trouble may be caused by one of

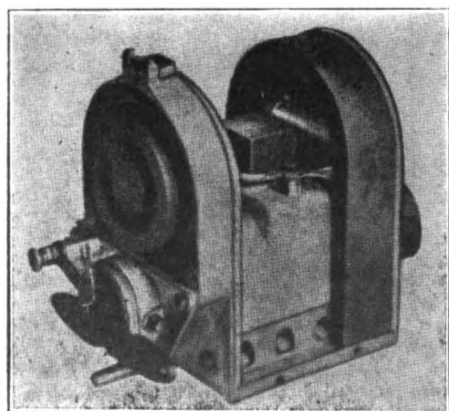


Fig. 7—Placing of Low-Tension Lead Strap for Electrical Connection.

several things. It may be moisture, or carbon dust, due to the wearing of the brushes. This can be removed by wiping out carefully with a dry, clean cloth. It may be that the surface of the cover has been charred by current leaking over the surface. If this is the case, it can be seen with the eye. There will be little creases

or fissures resembling the veins in the leaf of a tree. If these are found, it will be necessary to scrape them perfectly clean and shellac the surface or replace with a new distributor box cover.

If a spark cannot be obtained from the high-tension lead, remove the conductor which carries the current from the top

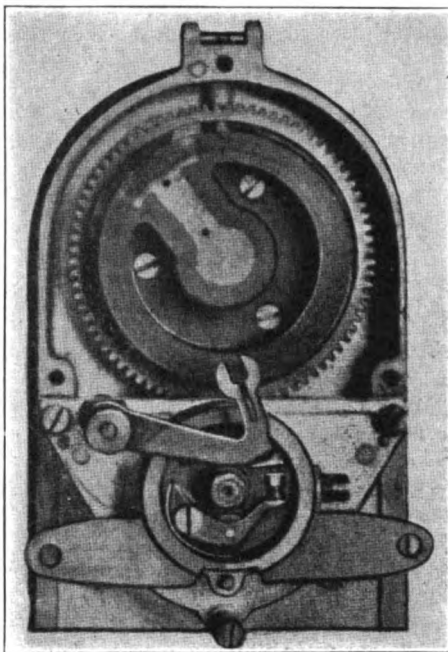


Fig. 8—Flat Brass Strap is the Condenser Connection.

of the coil to the distributor wheel and try at the coil. If a spark is produced at this point, there can be no possibility of trouble with the coil. The production of the spark absolutely locates the trouble between this point and the distributor box.

The location of this trouble then will depend upon the type of magnetos being used. To illustrate this clearly, it will be necessary to use one particular instrument, and after going over this thoroughly, one should be able to locate the trouble in any other type of instrument as the principle is exactly the same in all. All the difference is in the mechanical detail.

Referring to Fig. 6, it will be noted that the high-tension wire comes up through a pillar of hard rubber in the center. If in any way this insulating material is punctured, the electricity will flow through the hole to the shell of the magnet, causing a short circuit and, while the coil may be working perfectly, the current will not get farther than the hole in this insulating pillar.

This trouble may be tested for by removing the pillar, laying one end against the frame of the magneto and using an insulated wire with one end thrust down into the hole from which the pillar was screwed out, revolve the magneto armature, carrying the other end of this wire all over the surface of the pillar. If at any point the spark will jump through, this will locate the trouble.

If the hole or puncture is discovered, it

can be repaired by cleaning thoroughly and filling with shellac, or a temporary repair may be made by filling with sealing wax. Either of these repairs are only temporary, however, and should never be depended on for any length of time. A new pillar should be obtained to replace the old one as soon as it is possible to do so.

Again, the trouble may be found in the safety gap which is No. 118 in Fig. 6. This porcelain cover should be kept clean, as a layer of dust in foggy or damp weather will absorb enough moisture to form a circuit for the high-tension current to flow through, thus preventing it going on the spark-plugs. On some magnetos this safety gap is located on the inside where it is protected from dust and moisture, as in model T of the K-W magneto.

If one will give this subject a little careful study, it will be found that there is not a case of magneto trouble which cannot be located in a very few minutes. The tests may be made in a systematic manner, step-by-step, and the trouble located through a process of elimination. In the majority of cases of magneto trouble, it will be found unnecessary to dismantle the magnets, and this practice should be discouraged as much as possible. Almost every case of magneto trouble can be located without dismantling, and when necessary, only dismantle far enough to repair or replace the defective part.

It will also be noted that this method of testing a magneto, or rather making a magneto test itself, is done entirely without instruments of any kind. The only tools necessary are a pair of pliers and a screwdriver.

To handle this intelligently, one must remember that there are two distinct circuits—two distinct types of electrical energy—the primary, or low-tension circuit, having a pressure of from 10 to 12 volts, and the secondary, the pressure of which

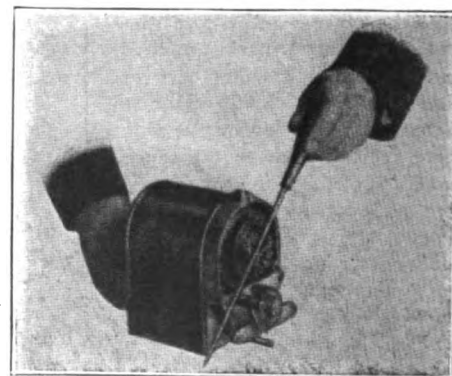


Fig. 9—Ground One End of Screwdriver.

runs from 30,000 to 35,000 volts. Dirt or oil, therefore, has an entirely different effect on the magneto in different places. For instance, dirt or oil between the breaker points will prevent low-tension current from flowing, whereas dirt and moisture on the safety gap, cover, distributor box,

(Concluded on page 26.)

Welding, Cutting and Brazing Practice

Acetylene Tank of Equal Importance With the Oxygen Drum—Three General Types for Use in Welding, Fundamental Principles Being the Same—Although Construction Varies—Some Suggestions for Their Operation and Care

By David Baxter

In the preceding article the oxygen drum, its properties and requirements were discussed. Let us now consider the acetylene tank which is probably of equal importance, if we do not count the water-type acetylene generator. This is to say that oxy-acetylene welding could not be accomplished without acetylene, any more than it could without oxygen.

In this, as well as in the preceding and following articles, the writer will endeavor to keep out all technical references and formulae. The explanations will be couched in plain, everyday language, expressly for the benefit of the beginner who is particularly interested in automotive welding.

There are three general types of acetylene drums for use in welding, and while their mechanical construction varies somewhat, the fundamental principles are the same for all. Therefore, to simplify the instructions given here, let us take as an example the drum put out by the Prestolite Co. In justice to other manufacturers, and to prevent any appearance of partiality, it is well to state here that one drum or its contents is probably no better than the others.

These drums are made of sheet steel, autogenously welded, and are usually tested up to double their required strength. They vary in capacity from 100 to 500 cubic feet, according to the service desired. They are loaded by first filling with a porous substance, such as asbestos cement.

This is thoroughly dried before the tank is filled with a colorless liquid known as acetone, which has a capacity of absorbing 25 times its volume of acetylene gas. These two elements, acetone and asbestos, are put in the tanks because acetylene gas is a violent explosive in its free state and can not be compressed in the empty tank.

The acetone will not run out of the tank, but may be drawn out to the deterioration of the welding flame, if a too large demand is made upon the tank capacity, such as would occur if too large a torch were used. It also will evaporate very rapidly if the tank valve is not closed immediately after the acetylene is all withdrawn.

The operator should not use a torch which is too large, or several torches on one tank, where they will consume more than one-seventh of the capacity of the tank. That is to say, the torch should not consume more than 15 cubic feet per hour from a 100-foot tank. To do this wastes the acetone and has an adverse effect upon the welding flame as well.

Cold weather has no bad effect upon tanked acetylene, so that it may be used in freezing weather. On the other hand, the tank should not be used or stored in a hot place. It should not be left near a hot stove or preheating fire, since the pressure doubles with the doubling of the temperature, which is not only hazardous but makes it impossible to execute a perfect weld. The extra drums of acetylene should, therefore, be stored in a cool place. They should not even be allowed to stand outdoors in the sun.

In many ways the acetylene tank is like the oxygen tank. It is not so easily tipped over, but ought to be fastened securely to the portable truck or to the work bench, whether in use or not. Like the oxygen drum, it stands to reason that it will give better results if kept in an upright position while in use. At least, the valve end of the tank should be elevated a foot above the floor.

Like the oxygen drum, the acetylene tank is not particularly dangerous to handle,



"Clean Tank Valve with a Sharp, Soft-Pine Splinter."

but it should not be subjected to heavy jolts, hammering, or hard falls—and in no case should the operator work close to the tank with the flaming torch in his hand, especially if there is any danger of leakage. Leaking tank valves have been known to ignite, however, and have been smothered with thick rags.

The porous filling of the tank completely soaks up the acetone, but this will not prevent the liquid from evaporating if the tank is left open. Care should always be taken to see that there is no leakage between the tank valve and the regulator or in the regulator itself. These leaks can be located by the odor—like ether—and if they appear to be serious, all flames in the neighborhood should be immediately extinguished, particularly if the welding shop is small. Remember that 10 parts of acetylene to 90 of air is explosive and may ignite from a tiny spark or a cigarette. The tank valve should be closed first until the leak is attended.

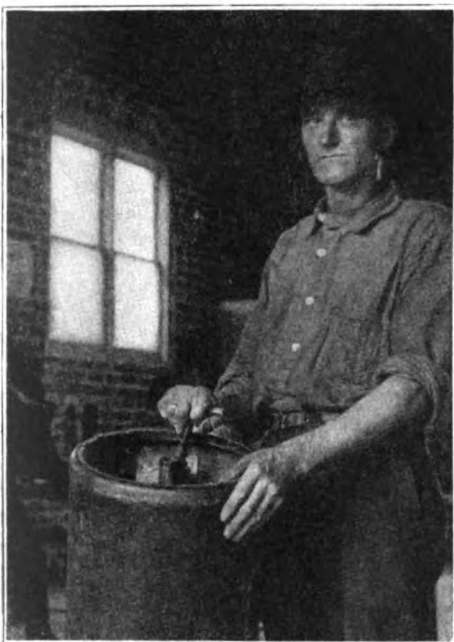
It will be noted that the tank valve has left-handed screws which is a device to differentiate it from the oxygen tank. The novice should remember this so he will not open the valve when he means to close it. This valve should always be closed at the end of the day's work. It may be the means of saving considerable gas to close it during the noon hour, too. The valve key should be kept near the valve in the event it is necessary to shut off the pressure in a hurry. A short chain by which the key may be fastened to the tank is an insurance against a lost key.

It sometimes happens that dirt or rust accumulates in the valve outlet, which will prevent the regulator connection from fitting snugly. This accumulation may be either caked mud gathered in transit, or it may be corrosion due to non-use of the tank. In either case, it should be cleaned out before the regulator is attached. An easy way to do this is to gouge the sediment loose with a sharp, soft-pine splinter and then blow it out with the tank pressure. If a wire or other metallic instrument is used to dislodge the dirt, there is danger of marring the seat and thereby causing a leak.

The dust accumulation is more easily blown out if the valve is opened and closed quickly several times in rapid succession. It is a good idea to examine all tanks for this dirt deposit, and probably a good idea to open each valve sharply before attaching the regulators. This eliminates the chance of dust or grit entering the delicate mechanisms of the gages and reducing valves. Some of it might even be carried to the torch where it would interfere with a proper adjustment of the welding flame.

Upon examining the acetylene drum, it will be seen there are four set-screws in each head and that each screw has a soft center of some easily fusible metal. These, like the soft-centered vent of the oxygen

tank valve, are a sort of safety device. In the event of a fire, these centers will melt and allow the acetylene to escape before enough pressure can be created by the heat to cause the tank to explode. The escaping gas will cause the fire to burn more fiercely.



"Blow Dust Out of Tank Valve Before Attaching Regulator."

of course, but the disastrous effects of an explosion will be averted.

In connection with the screws in the bottom end of the tank, it will be noted that there are a number of small holes in the flanged base of the tank. These holes are designed to form an outlet for the gas that escapes through the bottom screws, in case the tank is setting on end when the fire occurs. And this should be remembered: There is no excuse for removing or even loosening any of the set screws whether the tank is full or empty.

If by any chance a flying bit of metal ignites a leak in the tank valve, the operator need not get excited for, unless the leak is very large, it is readily smothered with a thick rag. If, through some inadvertence, the hose is blown from its fastenings, or the gages break, the operator should coolly shut off the gas at the tank valve the first thing.

In closing the valve it should always be turned firmly, but not too hard. In no event should a wrench or lever be used to force the closing. If the valve is screwed down too tightly, it is liable to be damaged; at least, the seat may be rendered defective.

When attaching the regulator, the operator should be sure it is resting level so it will not strip the thread. In the event that the thread does get damaged, it can sometimes be straightened with a fine three-cornered file, but the operator should not take the valve casting out of the tank in order to do the repairing.

To attach the regulator it is placed level in the seat and screwed down as far as possible with the fingers. Then a wrench is used to finish screwing down the nut. After this, the valve is opened slowly to keep the first in-rush of gas from straining the gages or reducing valve.

Like an oxygen drum, the acetylene tank is too clumsy and heavy to carry around so it should be moved about the premises by rolling it on one corner of the flanged base. One hand grasps the upper flange or valve casting while the other rolls the tank. With some practice an operator can soon learn to move a tank this way almost as fast as he can walk, and with two-thirds less labor.

This, however, is principally for moving the tanks from dray to storage, since every shop should have a hand truck, such as is shown in the illustrations, for moving the apparatus about the establishment or for taking it out on a job. For the latter a truck is almost an absolute necessity, even though the welder has a large generator for supplying the shop work.

In further connection with the fact that a tank should not be required to furnish more than one-seventh of its capacity per hour, it may be well to give a few words of caution in regard to a tendency on the part of some welders. This is the idea of using the small automobile acetylene tank for welding purposes. This should not be attempted except in extremely urgent cases, and only when a very small torch is being utilized. Even then it is best to connect several of the small tanks to the manifold.

If only one tank is used, it is almost certain that a large amount of the acetone will be drawn out. Too much of this liquid will result in a worthless weld, anyhow—in fact, one that is so brittle that it will not stand up under any strain, and should this weld happen to be located in some part of an automobile like the frame, it may result in a serious accident.

The capacity of the small tank is about the same as that of the larger welding drums which are filled in approximately the following proportions:

While the asbestos cement apparently fills the tank, in reality it fills only 20 per cent of the space on account of its sponginess. Then the acetone takes up about 43 per cent of the rest of the space. This leaves about 37 per cent of the total space for the acetylene, which is taken up or dissolved by the acetone.

The absorbing quality of this acetone is remarkable. At atmospheric pressure it will dissolve 25 times its volumes of acetylene, augmented, of course, by the pumped pressure.

When filling the tanks, the manufacturers are very exacting in regard to purity.

Every precaution is taken to see that no elements injurious to welding can enter the tank. It may, therefore, be said that tanked or dissolved acetylene, is more dependable than the shop-generated product. This is,

of course, taking human nature into consideration. Acetylene just as pure may be made in the shop, but as a whole the individual is more liable to make mistakes or to neglect some of the little things.

The acetone is supposed to be pure and especially not to contain any water, and likewise the acetylene. This is pumped into the tanks as nearly dry as it is possible to make it, but once in a while the welder will encounter a drum of acetylene that gives trouble from the time it is put in service until it is empty.

He wonders what is the matter, and as likely as not will blame the whole welding process, get discouraged and think the torch is not a success. Probably the entire difficulty was caused by moisture in the acetylene drum. There is really nothing he can do except to make the best of it until that particular drum is empty.

Water in the oxygen drum is fairly easy to get rid of. The operator has only to invert the tank several minutes to allow the water to settle around the valve and then open it several times in rapid succession. The force of the oxygen pressure will eject the water, but this course is not open to him with the acetylene drum on account of the porous filling in the tank. Any water that happens to be near the outlet might be expelled, but farther down in the porous matter it could not be ejected without wasting too much gas.

When using up the last of the acetylene in one tank the operator should remember



"Showing the Safety Devices at Bottom of Acetylene Tank."

that this is a critical point, for it is at the last where the greatest danger of drawing out the acetone lies. It is practically impossible to use all of the acetylene in a tank. There is always a small amount left which must be shipped back to the filling station. (Concluded on page 38.)

Legal Rulings of Interest to Garagemen

Exchange of Trucks by Salesman—Purchaser of Car from Authorized Dealer Protected Against Replevin—Liability of Garageman in Case of Destruction of Customer's Automobile by Fire—Negligent Driving by Chauffeur

By R. R. Rossing

Illinois Motor Vehicle Act Held to Be Valid.

The provisions of the Illinois motor vehicle act, article 7, prohibiting the driver of the tractor or other vehicle weighing over four tons from operating it across the edge of a pavement without protecting the edge by planks, though intended primarily for the protection of hard roads, is sufficiently related to the subject of the act as expressed in its title, which is, "An act in relation to motor vehicles," to be valid. *People v. Sisk*. Supreme Court of Illinois. 130 Northeastern 697.

Copyright on Piston Ring Advertising Pamphlet.

The copying by defendant from a trade paper, with its consent, and publishing in an advertising pamphlet, of a list giving sizes and description of piston rings used in different motorcars, which list was copied by the paper without consent from a copyrighted pamphlet prepared for advertising purposes by complainant, a business competitor of defendant, was held an infringement of the copyright, although defendant did not know that the list it used was copied from complainants'.—*Norris v. No-Leak-O Piston Ring Co.* U. S. District Court, Maryland. 271 Federal 536.

Salesman's Authority for Making Exchange of Trucks.

The purchaser of a motor truck is entitled to rely upon representation of salesman that his principal, whom he telephoned, had given its approval of an exchange instead of a cash sale, and the principal was estopped to deny that the salesman had authority to make the exchange, it being the custom to permit salesmen of motor trucks to make exchanges.—*Federal Supply Co. v. Wichita Sales & Supply Co.* Court of Civil Appeals of Texas. 232 Southwestern 879.

Purchase From Authorized Dealer Protected Against Replevin.

A man of small means procured an agency for the sale of automobiles from the distributor at Kansas City, Mo., and opened a garage and salesroom at Independence, Kans. By an arrangement between the distributor, the plaintiff, and the dealer, the latter obtained possession of automobiles in this way:

The distributor shipped automobiles to Independence, on bill of lading to its own order, notified the dealer, and advised the plaintiff. The distributor sent the bill of lading, with the draft for the price attached, to a bank in Independence.

The plaintiff mailed to the bank a draft to take up the distributor's draft and the bill of lading, and to pay freight and other charges. The plaintiff also instructed the bank to deliver the automobiles to

Three Classes of Good Workers.

There is a three-fold variety of good workers: First, the kind that carries out instructions, and needs some checking up; second, the kind that carries out instructions and needs no checking up; third, and most valuable, the kind that needs to get only a general policy, and then pushes ahead and accomplishes worthwhile things without needing to be checked up.—*Percy Owen*.

the dealer, on his signing a storage receipt acknowledging title in the plaintiff and agreeing to deliver to no one except the plaintiff or its order.

The dealer reimbursed the plaintiff for freight and other charges, paid 15 per cent of the distributor's price, and was given a written option to purchase. The storage receipt and option to purchase were not recorded. Without exercising his option to purchase, the dealer sold and delivered to innocent purchasers automobiles, the possession of which he obtained by virtue of the scheme here outlined.

The court held that the plaintiff is not entitled to replevin the automobiles from the purchasers.—*Missouri Finance Corp. v. McGowan*. Supreme Court of Kansas. 196 Pacific 614.

Garage Keeper's Liability for Car Destroyed in Fire.

In an action against garage keepers for destruction of plaintiff's automobile in a fire, the raking of ashes out of a furnace—allowing them to remain about a post supporting an oil-soaked floor—was negligence per se on the part of defendant garage keepers, and evidence of custom, method of construction, heating, etc., in other garages, offered by defendants and excluded, was immaterial.

In an action against garage keepers for destruction of plaintiff's automobile in a

fire claimed to have been caused by the raking out of ashes around a post under an oil-soaked floor, evidence offered by defendant garage keepers of a release of liability by contract consisting of a sign two feet square posted over the repairshop in the garage stating that the garage keepers would not be liable for loss by fire was properly excluded in the absence of proof or offer of proof that plaintiff ever saw it, contracts limiting liability for negligence being generally against public policy, and the mere posting of a sign being insufficient to establish one.—*Parris v. Jaquith*. Supreme Court of Colorado. 197 Pacific 750.

Written Guaranty Not Modified by Salesman's Conversation.

Where plaintiff purchased an automobile from defendant, and defendant's salesman wrote on the contract, "this car will be covered by the regular used Chandler guaranty," said guaranty was incorporated by adequate reference into the written contract of sale whether either party was familiar with its terms or not.

When the plaintiff purchased an automobile from the defendant, whose salesman wrote on the contract, "This car will be covered by the regular used Chandler guaranty," it was error to allow the plaintiff to introduce evidence of conversations with the salesman varying the terms of the guaranty.—*Raphael v. Hulett Motor Car Co.* Supreme Court of New York. 188 New York Supp. 209.

Employer's Liability for Negligent Driving of Chauffeur.

Where the sales manager of an automobile company who, with the company's knowledge, used one of its cars to travel between his office and home, directed the driver, after he had reached his home, to take the car to the company's repairshop or garage and a seamstress to her home a little beyond the shop, the chauffeur on the trip between the sales manager's home and the repairshop must be deemed acting within the course of the master's employment, so that the company was liable for the result of his negligence on that trip, even though it was contemplated that the journey should extend a short distance beyond the repairshop or garage.—*Clawson v. Pierce Arrow Motor Car Co.* Court of Appeals of New York. 12 181 Northeastern 914.

TESTING AND REPAIRING THE MAGNETO

(Concluded from page 22.)

or high-tension pillar will cause the electricity to flow where it should not go.

For that reason, certain parts of the instrument should be kept scrupulously clean to get the best results. Oil, however, does not injure a magneto with the exception of certain parts. It must not get between the breaker points. This and the distributor box are the only two points where oil will injure a magneto, except the shuttle-wound armature type using a collector ring and brush. In this type of magneto, oil must not get on the collector ring or brush. If it does, it will put the instrument entirely out of commission until it is removed.

There is one other trouble which occurs so seldom that it is hardly necessary to mention it. However, it is well for one who is doing magneto repair work to know how to find it. This is condenser trouble. It is not necessary to go into discussion as to the construction and functions of a condenser. It is sufficient to say that a condenser is for the purpose of absorbing the spark which otherwise would occur at the platinum points when they separate, thus injuring them.

When a condenser is in working order, there is no circuit through it. It simply has capacity the same as a quart measure or a bottle. The electricity can flow into it until it is full and then it stops. Therefore, to test for condenser trouble, remove the breaker box cover. Make the electrical connection by placing the low-tension lead strap as illustrated in Fig. 7.

Now rotate the armature and observe the points. If there is a reddish flash between the points, they are either dirty or the condenser is not in working order. So first eliminate the dirt, and then you can blame the condenser for the balance. If there is only a small bluish spark or none at all, the condenser is O. K. The condenser itself seldom goes wrong. When condenser trouble is experienced, it is quite often found that the connection from the condenser has been broken or is loose.

To become more familiar with determining the action of the condenser, take a model T K-W magneto, remove the cover and center magnet. Take out the screw which grounds one end of the condenser and also the high and low-tension wires. The flat brass strap is the condenser connection (Fig. 8). Leave this loose and put the screw back into place.

By revolving the armature, the spark at the platinum points can be observed. With the finger, hold the condenser connection against the screw and revolve the armature again. Do this several times until the eye has become accustomed to the difference in the appearance of the spark generated at the points. After this, the eye will tell you very quickly when the condenser is out of order.

A great deal of magneto trouble is caused by the improper setting of spark-plugs. It has been found that the average operator runs his plugs much too wide, thus throwing undue strain on the insulating material of the magneto. For example, we set a plug with 1/32-inch gap and under normal compression of the motor, the voltage or pressure on the magneto insulation will be in the neighborhood of 30,000 to 35,000 volts.

If the operator should be careless enough to let these points open up to 1/16-inch, which still would be a comparatively small gap, the pressure on the insulation of the magneto would reach from 60,000 to 70,000 volts. This might be sufficient to cause such great leakage across the surface of the insulators that they would become burned or charred, as they sometimes do, thus putting the magneto entirely out of service until this trouble has been removed. Therefore, never run spark-plugs with a gap wider than 1/32-inch.

In cleaning, repairing and adjusting a magneto, it is absolutely essential that all electrical connections on the low-tension circuit shall be clean and firm. The high-tension connections should be clean but it does not matter about the firmness as this current will jump a considerable distance and establish the circuit.

After the magneto has been re-assembled and everything put in place, the final test should be made. This is done by grounding one end of the screwdriver, as in Fig. 9, turning the armature over several times and bringing the screwdriver within 1/8th of an inch of each of the high-tension cable terminals.

As is often the case, the magneto may be working perfectly, itself, but the current is short-circuited somewhere in the distributor box. By testing one terminal, the magneto may be apparently all right, but by testing each separately, one would be found through which the spark could not be drawn.

This would indicate, in a moment, trouble on this particular terminal and, of course, would be a leak or short-circuit caused by carbon dust, a puncture, or something of the kind. By rotating the armature up to speed, a spark should jump 3/8th of an inch from each one of these terminals to the screwdriver. If it does this, you may rest assured that the magneto is in perfect working order.

Plans Made to Eliminate Transportation Evils.

Super-costly freight terminals, delayed tonnage and losses which follow in the wake of freight congestion, are economic evils which are to be "scrapped" under plans now being worked out by the transportation committee of the Federal Highway Council.

At a recent meeting in New York, this committee decided after deliberation, to "draft" one or more cities in the United

States and put what is known as store-delivery to a final test. Such form of delivery, it was explained, is the use of the motor truck and highway in conveying freight direct to the door of the consignee, instead of allowing tonnage to accumulate in warehouses, thus adding to congestion and financial loss which ultimately come out of the consumer's pocket.

Definite action was taken by the adoption of the following resolution:

"Whereas: It is the view of the transportation committee of the Federal Highway Council that relief from congestion and delay that normally prevails at railroad delivery stations in the handling of merchandise freight requiring station or platform service, can only be secured by a system for store-door delivery.

"Be It Resolved that the subcommittee on store-door delivery be instructed to take the matter up with the carriers and shipping interests at one or more points to be selected by them with the end in view of inaugurating a store door delivery plan at such point to points together with the rates, rules, and regulations under which it should be operated, and

"Be It Further Resolved that they are hereby instructed to report to the general meeting of the transportation committee a concrete plan for its approval."

National Highways Necessary for Food Transportation.

"Intelligent improvement and maintenance of our highways at comparatively insignificant cost, would save enough money in transportation costs to pay off the nation's war debt within the lifetime of the present generation and leave a handsome residue in the treasury besides," says Roy D. Chapin, chairman, highways committee, National Automobile Chamber of Commerce.

"This is a large statement, but one susceptible of proof. We have 6,500,000 passenger cars in the United States today. Assume that a national highway system of 30,000 miles should be constructed and maintained by the government. If each of these cars traveled but 1,200 miles a year on the national system, a saving of 1 1/2 cents a mile in gasoline and tire costs would easily be effected, or a total of \$117,000,000 a year.

"Government figures show that a saving of 17 cents a ton-mile in commercial traffic is made when roads are improved. The congressional investigation of 1912 deduced an annual highway traffic of 700,000,000 tons. A conservative statement would place the total today at 1,000,000,000 tons. On the assumption that but one-fifth of this traveled over the national system—and an improved road always draws much more—there would be a ton-mileage saving of \$123,000,000. Since the average haul is 10 miles an hour the actual saving per ton of merchandise would be \$340,000,000 a year."

Focusing the Headlight Bulbs

Early Sunsets Mean More Night Driving—Dealers Have an Opportunity to Sell Better Driving Light the Same as Any Other Kind of Service—Focusing of Headlight Bulbs Is as Essential as Adjusting Brakes or Carbureters

By Robert Livingstone

In the September issue of the *AMERICAN GARAGE & AUTO DEALER* we pointed out the necessity of making a pair of headlights point in the direction in which it is desired to throw the light. (Fig. 1.) Such advice would seem almost superfluous if it were not for the fact that so many motorists do not indicate by the condition of their headlights that they realize that it makes any difference how their headlights are pointed.

The importance of focusing bulbs is even more of a mystery to the car owner. This is partly because the mechanism for moving the bulb is usually concealed and partly because the car manufacturer never even mentions this matter in his instruction manual. In fact, he says practically nothing about headlights, just as if they were not expected to be useful.

The focusing of bulbs is always accomplished by moving the bulb backwards or forwards in the reflector to the point that will give proper results with the particular device that is used. With plain glass in the headlights, it doesn't make very much difference where the bulb is placed just so that there is no black spot in the beam of light that is thrown.

But when lenses are used to improve the light and make it legal in the many states which have lighting laws, the position of the bulb becomes of utmost importance. Lenses will not stop glare or give a good light unless the bulbs are properly adjusted for the particular make that is used.

In every headlight there is some mechanism for moving the bulb to the proper point. In a way, it is like a nozzle on a garden hose which throws the water in a small straight stream or sprays it over a large area. This provision for adjustment is necessary because there is so much variation

in the length of the bulb filaments in different bulbs. It must be made every time the bulbs are changed.

Some of the more common methods of moving the bulbs to the correct positions are shown in Fig. 2. In Fig. 2-A the screw

tomer do his own installing, with more or less success, or making no charge for the job and losing money on the deal.

There are four definite positions of the bulbs that are commonly called for by different lenses or other devices. The lenses

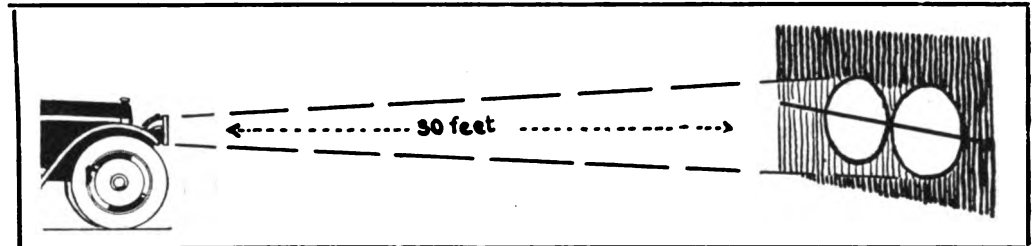


Fig. 1—Headlight Should Point in Direction in Which It Is Desired to Throw the Light.

at the back center of the housing pulls the bulb back and forth. Turning the screw "in," draws the bulb back. This is used on the Ford, Overland, Studebaker, and other cars.

In Fig. 2-B a screw is used in front at the edge of the reflector. The Cadillac car furnishes an example of this. The headlight door must be opened to get at the screw.

In Fig. 2-C there is a ratchet or friction in the tube which holds the stem of the bulb. Better remove the reflector and examine the mechanism before attempting to operate it. The Dodge, some Fords, the Mitchell and other cars use this type of adjustment.

So much for the mechanism that moves the bulbs. The idea is usually simple enough, but it is often so poorly made that considerable work is necessary to make it operate. This work is a legitimate service that should be charged for the same as any other work on a car.

We mention this because some repairmen are in the habit of taking the profit on the lenses they sell and either letting the cus-

tomers are designed only to work with their own particular bulb positions.

These positions have been given arbitrary numbers, merely to distinguish them from each other. All are standard and commonly used, and every repairman should be familiar with them. We will describe them in the order of their numbers and explain how each is secured and what it accomplishes.

In making any of the following adjustments it is best to place the car on a level surface facing a wall, fence, or door and about 25 or 30 feet from it. Remove the glass in the front of the headlights, and then cover or disconnect one of them so that only the light that is being adjusted is thrown at the wall. The wall, preferably, should be white or of a light color.

In the case of some headlights—particularly those which have an adjusting screw at the back—it will be found that the reflector jumps forward by spring pressure when the glass is removed. In that case, put the headlight rim back into place and block the reflector back into place with little strips of wood or cardboard of the same thickness as the glass.

This will hold the reflector in the same place as when the glass is in the lamp. If you do not do this, the inserting of the glass will throw the reflector back with relation to the bulb and spoil whatever focal adjustment has been made.

The No. 1 focal position merely means that the filament of the bulb is at the "focal point" of the reflector. Simply move the bulb backward and forward until you have the smallest spot of light on the wall that you can get.

With this position, the rays of light are sent out of the reflector in what is prac-

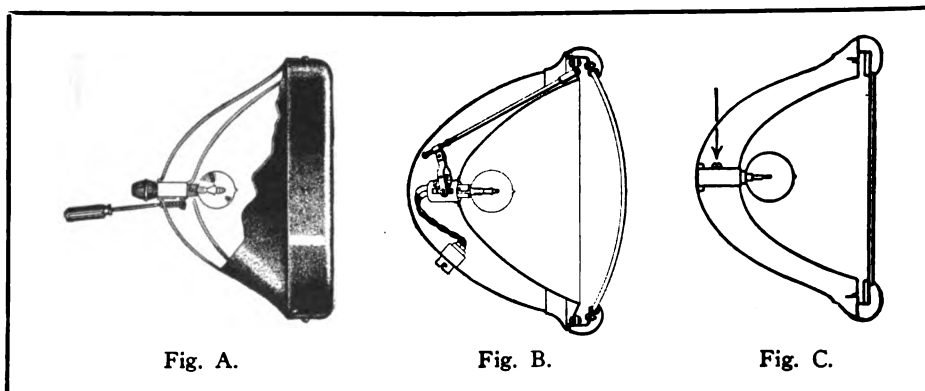


Fig. 2—Showing Several Methods of Moving Bulbs to Correct Positions.

tically a cylinder having the same diameter as the front of the headlight, Fig. 3. In fact, if the filament were a perfect point and did not have a very perceptible size, and if the reflector were a perfect parabola, and if the bulb were held exactly in the axis of the reflector, the beam of light

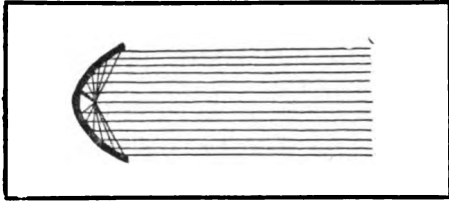


Fig. 3—Showing No. 1 Focal Position.

would be a cylinder, and the spot of light on the wall would be exactly the same diameter as the reflector.

This position of the bulb is of no value for lighting the road if plain glass is used because, while it will throw the light for a long distance ahead, the beam is too narrow to light the full width of the road.

In practice, the No. 1 focal position is used only with certain makes of lenses which have been designed for use with it. All of these lenses have the fault that, while they stop glare, they accomplish it by bending the light down and fanning it out sideways. As a result, a great deal of light is wasted at the sides of the road in the distance, and the illumination in the center and on the edges within 50 feet of the car is not as intense as it should be.

In the No. 2 focal position all of the filament is behind the focal point of the reflector. To get it, find the No. 1 position, as just described, and then move the bulb back into the reflector until you have the largest spot of light you can get on the wall without a black spot in the center, provided you have a spiral filament bulb. If the bulb has a V-shaped filament, there

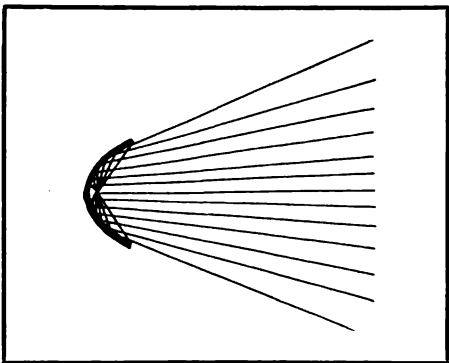


Fig. 4—This is the No. 2 Focal Position.

will be a small black center to the spot of light on the wall.

The No. 2 focal position, Fig. 4, is used with types of lenses which are designed to distribute the beam of light efficiently on the road so as to give the best possible illumination. It is also used on a few types which operate by bending the light down and fanning it out sideways.

only position of the bulb with which glare. This is the position used with the green-painted glass used on Ford cars, and is the can be stopped by painting the top half of the glass. This sort of makeshift, while perfectly legal, is not to be recommended because it cuts off half the light from the reflector much the same as drawing a curtain half-way down cuts off the light that comes through a window.

In the No. 3 focal position the front end of the filament is at the focal point and the remainder is back of the focal point. There is a slight spread to the beam, about half-way between No. 1 and No. 2, Fig. 5.

Both the No. 2 and the No. 3 focal positions can be checked by covering the top half of the front of the headlight. If the shadow on the spot of light on the wall is in the top half of the spot, you can be sure that the bulb is behind the focal point of the reflector.

The No. 4 focal position means that all of the filament is forward of the focal point of the reflector. Get the No. 1 focal position first and then move the bulb toward the front until, when the lower half of the headlight is covered up, the upper half of the light spot on the wall is cut off, Fig. 6.

It will be evident that, when the bulb is adjusted this way, it is the light from the top half of the reflector that is being thrown down toward the road while the light from the lower half of the reflector goes up into the air. To stop the glare, it would be necessary to paint the *lower* half of the headlight glass.

Generally speaking, this position is used only when the focusing mechanism is so defective that the bulb can not be given the No. 2 position and it becomes necessary to adopt the painted glass to stop glare. Only a very few lenses use this position.

The card method of focusing is very simple and more accurate. It should be used if possible.

Cut a circular card large enough to cover the front of the headlight. Draw a line straight across it through the center. On this line, at points two inches each side of the center, punch quarter-inch holes.

Place this card over the front of one headlight. The car should be about 25 feet from the wall as before. You will notice that two enlarged images of the filament are thrown on the wall showing that the beam of light is made up of nothing but filament images.

At the No. 1 focal adjustment these images will be on top of each other, showing that the rays are parallel.

At the No. 2 focal adjustment the points of the images will be toward each other and about six inches apart, and covering the upper hole will cut off the upper image.

At the No. 3 focal adjustment the points of the images will be toward each other and will just touch.

At the No. 4 focal adjustment the open ends of the images—that is the bases of the V's—will be toward each other and

about six inches apart. Covering the upper hole will cut out the lower image, showing that the rays of light cross each other before striking the screen.

Frequent Checking Necessary.

No one of the focal adjustments has any particular advantage over any other. All are very easy to secure. The results in

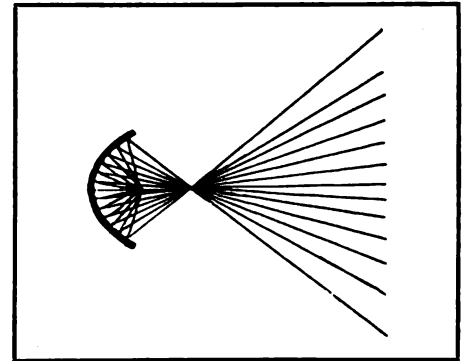


Fig. 5—No. 3 Focal Position.

the way of light on the road are very different and whatever adjustment is required must be carefully made. Also, owing to the poor mechanical construction of most headlights, it is necessary to check up the adjustments from time to time to be sure that vibration has not changed them.

It is only by keeping the headlights properly adjusted that even a fairly good light can be produced and if there is any one thing that can make or mar the pleasure of motoring, it is the condition of the light.

The matter of the legality of the lights also enters as a reason for keeping the lights properly adjusted—even if the motorist is not interested in having a good light for himself. Legality exists only as long as the lights are correctly focused.

The presence of lenses in the headlights will not protect you from the police unless the lenses are operating correctly. Remember that the headlight laws do not say anything about having lenses in the headlights—they only say what kind of a light you must have.

Illuminating Engineer at Your Service.

The AMERICAN GARAGE & AUTO DEALER has retained Mr. Livingstone, who is an

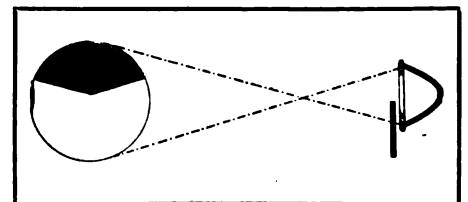


Fig. 6—No. 4 Focal Position.

authority on automobile lighting and headlight laws, to assist its readers by answering any questions they care to ask. This department can be made doubly interesting and valuable if you will feel free to write us about your lighting problems. This is one of the many forms of service that we consider a part of the duty of a trade paper to maintain and we hope it will be used.

Glimpses in the Garageman's World

One Garage Found that Extra Service for Which There Was No Charge Made Friendly Customers—Don't Overlook the Business Which the Traveling Salesman Has to Give—Two Plans for Conveniently Handling Items of Stock

"Part of Our Regular Service."

There is a multitude of things about garage service that the observant chap can pick up in a trip across country. It is a rather regrettable fact, however, that service in the usual garage is conspicuous by its frequent absence.

But there are exceptions to this condition of affairs, I am glad to say. And how grateful the average motorist is for real service—the kind that is extended in a courteous manner, and not the usual commercial courtesy.

Recently, on a trip with a friend, I ran across a service that struck me as being unusual and a service—in our own case, at least—that was deeply appreciated. Likewise, it meant money to the garage that extended it! Surely that is a desirable combination!

At the end of a hard day's drive, we drove into a city of about 15,000 and into the first garage at hand. Fortunately, it was a good garage! We were tired, dusty and hungry, and hurried to our hotel. The next morning we wended our way to the garage where the car had been stored for the night.

In the morning, on this trip, it was our custom to make a general inspection of the car. But this morning we found a genuine surprise waiting us. Attached to the radiator cap we found a blue tag.

"Look at this!" my friend exclaimed, and hurried over to look at the card. At the top of the card, which was about 5 ins. by 6 ins., was printed in red letters: "This is part of our regular service. It doesn't cost you anything."

The card was divided into sections that provided for a regular inspection of every car. The radiator had been filled with water. The cushions and top of the car had been wiped clean of all dust. The amount of gasoline in our tank was indicated on the card. The amount of lubricating oil in the machine was likewise indicated.

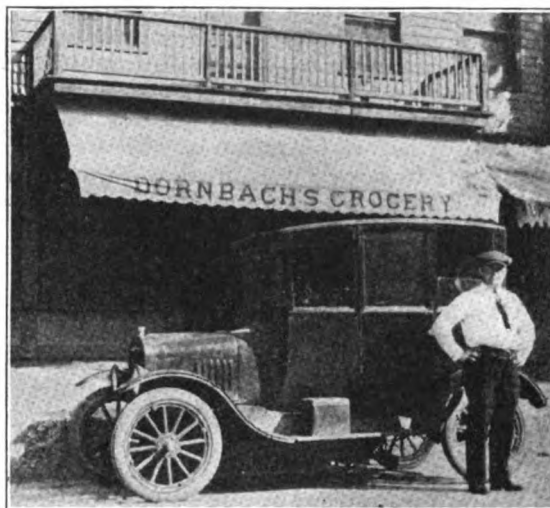
The condition of the batteries was marked plainly and a notation to the effect that the right-hand, outer, brake band needed tightening, was enlightening to us.

There was a further notation as to the air pressure in all four tires when we drove into the garage, and a further notation informed us that all tires now had air to the proper (and indicated) amount. The general condition of the tires was noted and we were informed that our left rear tire had a bad stone bruise that should have attention.

That just about completed the informa-

tion contained on the card. We sighed contentedly. Our usual morning inspection had been completed in three minutes by reading that little card. And it didn't cost us a cent, either!

I hunted up the manager of that garage



Ford Sedan Carries This Salesman to His Rural Customers.

and asked him about the free service rendered. I asked him if it paid, how much it cost the garage and how he came to start such a service.

"In the first place," he answered, "it always struck me that the person who stored his car in a public garage was entitled to some measure of voluntary service. After I became manager and part owner of this garage, I gradually worked out the service card system. The plan was very easy to put in effect.

"We are forced, like all large public garages, to keep at least two men here all night. As a rule, the night men have things pretty easy. They used to earn their money by playing cards all night, taking care of what small amount of business came in and washing a few cars. But my men work now—they earn their money, I tell you!

"Every car that comes in here for the night, whether it be that of a regular storage customer or a transient, is entitled to a free inspection. There is no slighting of any part of the service. Radiators are filled. Tires are inspected and pumped up to their required limits. Batteries are tested and gasoline and oil measured accurately. Cushions are cleaned with a vacuum cleaner and the windshields wiped clean. Brakes are tested, also.

"The result is tabulated and the car

owner is saved time, worry and trouble. That this item is appreciated is shown by the fact that our regular storage space is now completely taken up and is a very profitable side of the business.

"Before this service went into effect, our storage customers drove their cars off, not knowing the things we tabulate on the service card. Consequently, they bought oil, gasoline, tires, at other garages—and we lost a lot of business that actually should have gone to us. Now the tide changes. Our customers buy from us. If gasoline is low, or oil is low, the purchase is made before the car leaves the garage.

"Rendering this service costs us practically nothing and it brings in new customers, helps retain the old ones, and keeps both classes satisfied. Incidentally, our sales and profits have increased nicely."

As further evidence of how this system pays out, I might state that in our own case we bought 15 gallons of gasoline, a gallon of lubricating oil and a blow-out patch to use in case the stone bruise gave us trouble.

It seems to me—and I am fairly familiar with the garage business, too—that here is a scheme that could and should be adopted by every garage. The cost, as stated, is practically nothing and such a service would be bound to bring in additional sales and keep customers steadily depending upon the garage rendering it.

The Steady Customer.

For many years the backbone of the hotel business has been the traveling salesman. It was the one kind of patronage that could be counted on seven days in the week and 365 days in the year. Pay was just as sure as the customer. In small towns, the hotel manager learns when to expect the different salesmen who make his town and can figure ahead on the demand for rooms and meals.

Out of this steady and assured business which the traveling salesman makes for hotels in towns small and large, has grown a feeling of dependence on the part of the hotel men upon this class of patrons. As a consequence, they treat them as a preferred class, having found that their bread and butter depends upon doing so.

The small-town garagemen, who are awake to the trend of business in their line, see that the traveling salesman is going to supply a few vertebrae to their garage business. There is nothing more noticeable today in small-town business than the abandonment of the train for the motor car by traveling salesmen.

In cars they flit here, there and everywhere about the "Main" street of every small town nowadays. As roads are being improved, the length of the season in which they may call upon their customers by car constantly lengthens. In many places where there are paved roads, salesmen are calling upon the trade the year around, using the motor car exclusively.

Where these "year around" roads are not yet built, they use the train in the winter, and along in April get out the car. From then on, until deep snow comes, they do business almost entirely by car. This gives an eight months' or sometimes nine months' season.

Just to find out what a small town could produce in a single day in the way of traveling men doing business by car, I kept a casual count of those seen on the main street of an Iowa town of about 1,200 population. The number included a representative of an electric supply house, a flour salesman, a subscription solicitor for a daily published in a nearby city, a shoe salesman, a farm implement man, a representative of a cigar and tobacco house, and a salesman for a fruit company.

Closed cars were favored, and more of them were coupes than sedans. Only one was an open car, and that was a roadster. The shoe man had broken up his trunks and had trays made to fit the car, and was carrying his samples that way.

Some of the cars were in town for only a short time; others spent a considerable part of the day there. Practically all of them stopped at one of the three garages in the town to get gasoline or oil, to have

must do, and in all kinds of weather, it seemed likely to me that they are going to be, if not already, as steady customers and as dependable a source of business for the garagemen as they have always been for the hotels. Time is money to them, and the garage that gives them prompt service—putting them in the preferred class as it were—will get their business each time they make the town.

As for the car-selling end of the business, they are bound to be steady buyers of cars, as they eat up the mileage at a rapid rate, and the worn-out car will be a money-loser for them and, therefore, is not tolerated. How certain the car is to grow in popularity with the traveling salesman may be gathered from the statement of the salesman for a fruit company whose photograph I took as he was calling on one of his grocer customers.

"My territory is three counties," he said. "I live near the center of the territory and make twenty-four towns. With my car I make the twenty-four in four days each week and have three days at home. By train it takes me five days to make twenty towns, and the other four towns I have to alternate, making them every two weeks. This means a loss, as I should visit all my customers once a week. With a car, I can do more business in four days than I can in five by train, and can have three days at home instead of two.

"Most of my towns have only two trains a day each way, and some only one. Suppose my best customer is out and it is near train time. If I am traveling by train, either I have to lose my order or wait over half a day or maybe a whole day. With a car, I can wait until he comes in or is at leisure. This is a big advantage.

"Then, I am saved traveling at night. Sometimes it takes me, with the car, until eight o'clock in the evening to make my average of six towns a day, but it is never later than that. With the train, I have to be up half the night part of the time. Also, I am saved all the hot, dirty traveling on local trains. Really, if it were not for my car I believe I'd give up the road."

"How about expense?" I asked, as he concluded. "It's cheaper using a car, I suppose."

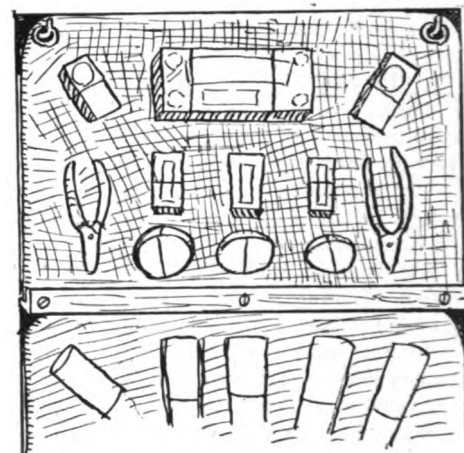
"No, I can't say that it is," he answered. "It figures about the same. The garagemen and automobile dealers get the money instead of the railroad. That's the only difference. Even if it cost more, I'd be ahead anyway, for I don't pass up customers as I often have to do when I go by train."

Two Practical Stock Plans.

In his stock shelves, a dealer carries various amounts of supplies and his system of pigeonholes allows for this. His crosspieces are grooved at uniform intervals for the partitions, but he can slip out the partitions whenever desired and thus make certain pigeonholes twice or thrice the regular size. Later, if there is

necessity, he can slip back the partitions to reduce the size of the pigeonhole.

A good many of his items in the salesroom are shown on display doors, and he has found that it pays to have the goods



A Sliding Door Device which Displays Tools Effectively.

thus in sight. Many times a man will see something which he needs, but which he did not have in mind when he first entered the room. The display makes an extra sale.

Recently the dealer improved on the type of display door used. To each door he fitted three boards covered with leatherette. At each upper corner, are two grommets which fit over hooks in the door. Below the board a piece of wood is screwed to the door and it has a groove at the back along which the board slides.

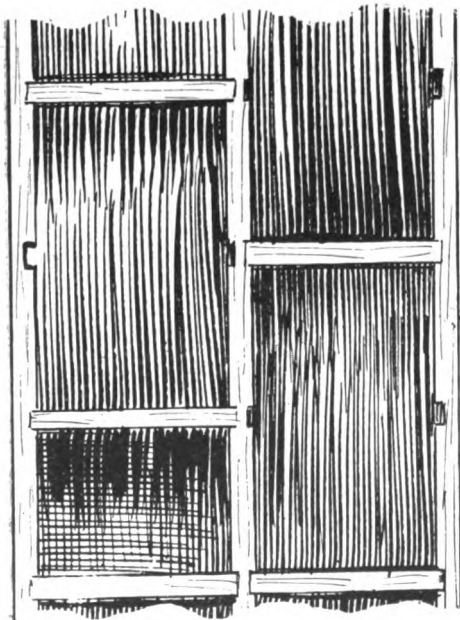
Now, when a man wishes to look at a line or an article, the salesman simply removes the desired board from the door and lays it on the counter before the man. It simplifies and speeds selling.

Friction Losses in Tractor Engine Decrease Power.

Every tractor operator should manipulate and care for his machine so that he can make available at the draw-bar the largest possible part of the power generated by the spark and the gas. Fuel fed into the engine would produce 100 per cent power were it not for friction, radiation, exhaust and other losses.

Friction loss is the power required to operate the machine and keep it going and represents a power loss. Friction losses usually run from 10 to 15 per cent. A great amount of heat is carried away by the exhaust gases and these reduce the power from 28 to 33 per cent. Cooling and radiation losses are caused by the necessity of maintaining a temperature low enough to permit of ample lubrication inside the motor, and these run from 39 to 40 per cent.

These losses leave the power available at from 12 to 22 per cent. By strict attention to lubrication, care of cooling mechanism, and general wearing parts the power may be greatly increased.



Makes Pigeonholes Any Size with Removable Partitions.

some repair work done, or, at least, to have a garageman look under the hood. They were cash customers, of course.

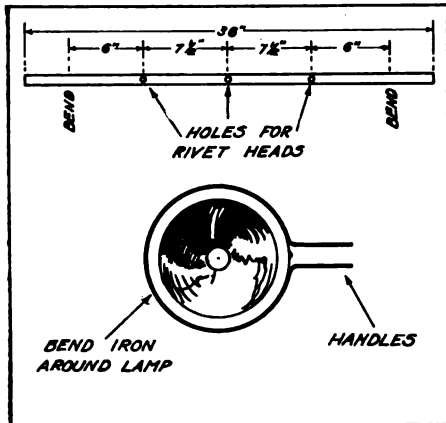
As I watched one of them buy gasoline and thought of the continuous driving they

Practical Hints for Shop Mechanics

Replacing Rims on Ford Lamps.

I am sending you a suggestion which will be found helpful by any Ford owner or garageman.

The door rims on the Ford lamps are often difficult to remove, as they will



Takes Lamp Rims Off Quickly.

sometimes become a little rusty. With this suggestion, you can easily put the rims back firmly upon the lamps.

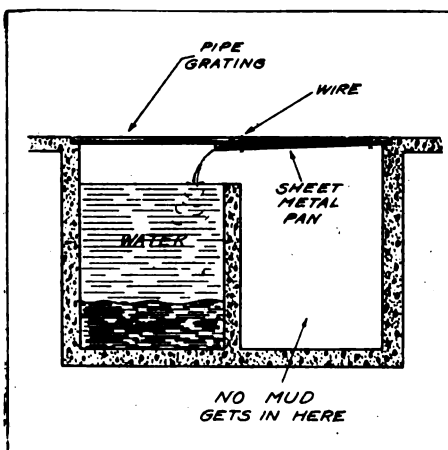
Take a piece of metal strip about $\frac{3}{4}$ -inch wide and bend as shown in the illustration. The strip is 36 inches long. With this small outfit the lamp door will have to come off. Just put it over the lamp rim and then squeeze the two handles together and turn. Grip it and pull up, and off it comes.

This saves labor and time by taking the rims off quickly.—E. S., Iowa.

* * *

Sump-Hole Cannot Be Clogged.

One of the greatest difficulties in the designing of a sump-hole for the washrack



Showing Cross-Section of Concrete Sump.

in a garage is the problem of providing against the stopping up of the sump-hole.

This is how the problem has been solved:

The illustration shows a cross-section of a concrete sump. The sump is divided into two sections. The water and mud drops into one section and the water rises and flows over the top of the concrete dividing wall, leaving all mud behind in the section which can easily be cleaned out.

At the top in the illustration can be seen the grating which is made from pipes, bolted together. Suspended under the grating is a piece of sheet metal. This extends a little over half-way across the sump. This sheet metal diverts the water and mud from the washrack into the proper section of the sump.—C. W. G., Cal.

* * *

Smoke Hood for Forge.

Owners of small, portable forges frequently wish to use them in a building, and find that a means of drawing off the smoke is needed. I secured an old dish-pan and a few joints of stove-pipe and made the device shown in the illustration.

Cut a smooth hole in the bottom of the pan the size of the stove-pipe. Then slit the ends of a joint of pipe with a tinner's shears for about three inches.

Bend down three ears on the inside of the pan, after the pipe has been placed in the hole, and rivet. Support the pan over the forge with wire hangers.—R. W. T., Mo.

* * *

Wheel Repair Stand.

It is very annoying to have grease, balls, ball races, etc., flying all over the shop when punching old ball races from Ford front wheels. The following method will prevent this:

Lay the wheel over the open top of a nail keg while working on it. This holds the wheel at the proper height for easy work while the keg catches all grease and broken parts which would otherwise clutter up the shop.—D. & F., Mo.

* * *

Repairing Washer Pins.

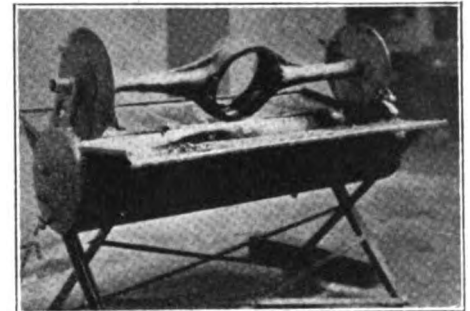
The small pins which hold the steel washer between the Ford rear axle housing and the thrust washer often become worn or break off. If the equipment is at hand, they may be drilled out and replaced.

Another quick method of making a repair consists in placing the three washers in a small ring of sheet metal. The ring should be about the width of the three washers and riveted or soldered together so that it is but slightly larger than the washers. In this way, the washers are held in place and there is no danger of the steel ring dropping down where it may bind and cause damage.—S. E. G., Iowa.

Transmission Housing Tray

The illustration shows how an old boiler has been converted into a handy tray for washing transmission housings.

It is equipped with legs made of angle



Old Boiler Makes Handy Tray.

irons, and can easily be moved about.

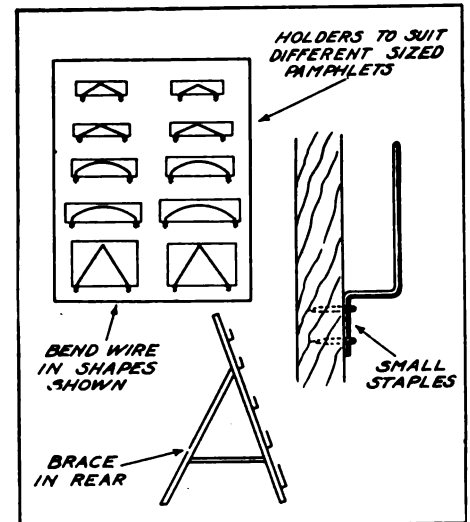
In the end of the boiler is a cock for draining the wash tray.—W. G. C., Cal.

* * *

Handy Home-Made Creeper.

Get a new piece of No. 26 gage galvanized iron, 30 by 60 inches. Cut off the corners and turn the edges over a quarter-inch rod. This will stiffen it and make it easier to handle.

Oil and dirt may be easily wiped off,



Fine for Advertising Literature.

and the clothing kept away from a rough or dirty floor. The more the creeper is used, the slicker it gets, making it very easy to slide into position under a car.—O. C., Tenn.

* * *

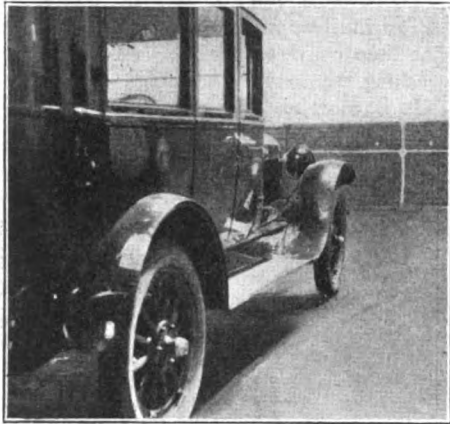
Hint for Filing Advertising Matter.

The illustration shows a good method for handling advertising literature which may be found helpful. As may be seen, it is very simple of construction. All you need is wire and staples and lumber for display board and support.—W. L. W., Ill.

Testing Headlights in Garage.

The illustration shows a method of testing headlights by means of a system of vertical and horizontal lines and dots, painted at one end of the garage.

Two dots correspond to the exact center



Automobile Centered by Vertical Line.

of the lamp. The vertical line is for centering the automobile. In order to comply with the California state headlight law, the direct rays of the headlight must not strike the wall above the horizontal line when the car is 30 feet distant.—C. G. W., Cal.

* * *

A Valve Core Trick.

The little three-prong arrangement, which is put on valve cores to hold the little spring in place, sometimes comes off and stays in the valve stem when the core is removed.

A slim wood screw turned into this little three-pronged piece will remove it easily.—A. C. O., Nebraska.

* * *

Spare Time Work.

Many cars come in with the terminal on one or more of the battery cables corroded or eaten up. To get these out in a hurry we find it practical to make up a number of cables and have them ready. Then an exchange is made and they have new terminals soldered on in spare time and are ready for the next customer.

The same thing can be done with spark-plug cables and magneto cables.—R. W., Mo.

* * *

For Removing Broken Lamp Bases.

A carriage bolt forms the basis for a simple home-made tool for getting the broken bases of lamps out of sockets. Flutes are cut in one end of the bolt and the other end is flattened for a handle.

The bolt should be large enough to make it necessary to use some force in getting it into the base, which it will grip and make it easy to screw out.—W. H. J., Pa.

* * *

Oiling the Drill.

Every man working in a garage or machine-shop and running a drill knows that the drill when used in drilling metal or

iron requires oil. Generally an oil can is used to oil it. Why not take a one-inch brush and have a small can of oil near and use it? A dip into the can of oil with the brush will oil the drill many times. All that is necessary is to press the brush against the drill and the oil does the rest.

The brush will not be taken from the drill press and carried away and used for something else, while the oil can is often used for something else and carried away.—B. S., Iowa.

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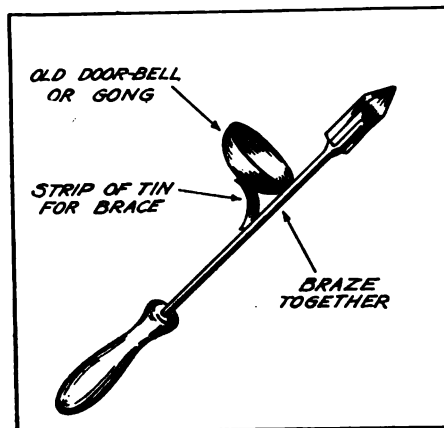
Shellac Containers.

Most shops purchase shellac in jugs or gallon cans. Nearly as much is allowed to dry up as is used. Go to the shoe-shining parlor and get a number of shoe dressing bottles and wash them out. Also wash out the daubers attached to the corks and transfer the shellac from the large container to the bottles. Keep them corked, and when ready to use, the dauber is very handy for applying the shellac.—L. C. M.

* * *

For Catching Dropping Solder.

A gong from a doorbell, brazed to the handle of a soldering iron, catches the



Useful When Working Overhead.

dropping solder when working overhead. It also serves as a rest, and shields the hands from the heat.—S. E. G., Iowa.

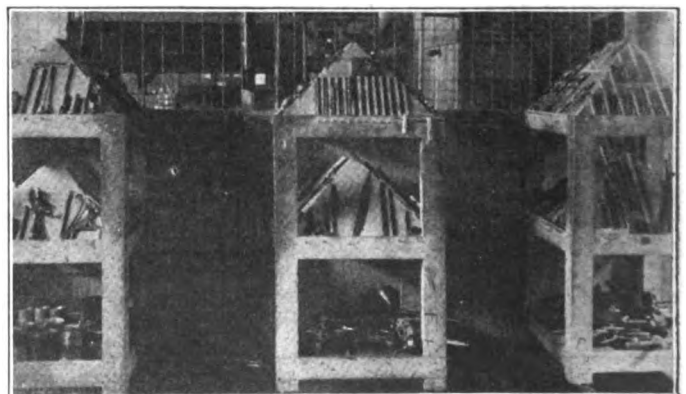
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Pyramids Carry Tools in Garage.

The illustration shows three pyramids designed for carrying tools in a garage.

Each pyramid has three tool racks—one at the bottom, one at the top and one in the center. This allows the pyramid to carry a large variety of tools on each rack, and they are easy of access.

Each pyramid is supported on four casters, and can easily be moved about the garage.—W. G., Cal.



Each Pyramid Has Three Tool Racks.

Battery Compound Container.

In the battery department it is necessary to seal batteries, and a most convenient manner for the handling of the sealing compound is to place it in a small coffee pot and heat with a blowtorch. When melted it may be poured through the spout to the place needed.—R. T. W., Mo.

* * *

Bending Pipe and Tubing.

Should an attempt be made to bend pipe without filling with something it is almost sure to flatten at the bend and thus cut down its capacity. Try filling the pipe with fine sand and then plug each end.

Some use water, but this is impossible if the pipe has to be heated. A small tube may be filled with melted resin and the resin allowed to harden. After bending, it may be heated and the resin poured out.—L. V. C., Ind.

* * *

A Remedy for Throttle Air Leaks.

A throttle stem often becomes worn or wears the bearing in which it turns and causes air leaks which interfere with the smooth running of the engine. The stem should be removed and the bearings filled with solder and then redrilled. If the stem is worn it should be replaced.

This treatment will in many cases restore an old carburetor to usefulness and make it possible to get good results even at low speeds.—M. R. B., Ill.

* * *

When Gasolene Is Low.

If you get stuck on a steep hill with a Ford, for want of gasolene, just insert an inner tube in the gasolene tank and then pump it up until the gasolene starts to flow.

This works fine when you are a long way from home and there is not enough gasolene to go over the top.—W. D. G., Wash.

* * *

Save Your Crankcase Oil.

Oil which has been drained from the crankcase of engines can be used in a number of ways. It is better than unused oil for springs, as the kerosene penetrates farther into the spring and carries some oil with it. It can also be sold to farmers for hog oilers.—G. E., Iowa.

Readers' Questions and Answers

Testing Motor Fuels.

I should like to learn of some good method for testing motor fuels. Can you give me any information along this line?—L. F., Cal.

The deciding test of the utility of a fuel is in its action under operating conditions. An engine test is the most satisfactory for learning whether the fuel will give prompt response to the throttle, flexibility and smooth running at different speeds and easy starting in cold weather; also, whether or not there is a tendency to deposit carbon. These conditions are best determined by the engine test.

A chemical test will determine for you the volatility of the product, whether the light hydrocarbons ordinarily entering into the composition of petroleum are present, and whether it contains the light hydrocarbons due to decomposition or "cracking" of heavy oils.

A chemical test will also decide whether or not other objectionable ingredients are present.

* * *

Recharging Ford Magneto.

Kindly explain to me the method of recharging the Ford magneto by passing a current through the coils. How much current is required and how should it be done?—J. B., Nebr.

Use 30 volts from storage batteries—five six-volt batteries connected in series; that is, connect the positive pole of one battery to the negative pole of the next one to it and so on until five batteries are connected.

Now, with an ordinary watch compass held closely above the transmission cover, find the north pole of one of the magnets of the magneto. Then have someone turn the motor slowly until the north pole of the magnet is about one or 1½ inches to the left of the magneto contact plug, and the south pole will be about the same distance to the right of the magneto plug.

Connect a wire from the positive pole of the batteries to the magneto contact. Connect another wire to the negative pole of the battery. With the opposite end of the wire, touch the motor or frame of the car 15 or 20 times, just for an instant each time. If the contact is held on any length of time, it will melt the contact spring in the magneto plug.

The crankshaft should vibrate endwise in the motor. When you make a contact with the wire on the motor, if it does not vibrate, it can sometimes be started to vibrating by working the emergency brake lever up and down.

After making the contact 15 or 20 times, turn the motor exactly a quarter turn. The magnets should be in the same position with

the compass. Then go through the same operation as before.

Turn the motor another quarter turn and go through the same operation again. When you have recharged all four quarters, disconnect the wires and start the motor. Test the magneto with a voltmeter.

Magnetos on cars of the 1915 model and later should generate 30 volts at the highest speed of the motor, while the older models will generate only 20 volts. If they are weaker than this, it will cause the motor to start hard.

If the instructions are not followed out carefully, the magnets of the magneto will be demagnetized instead of recharged.

* * *

Engine Knock and Grinding.

We have an Overland 90 model in our shop which does not seem to work right. We have overhauled the engine completely and replaced with new parts where needed. It seems to have a sharp knock which is the same when idling and running. Otherwise, the car runs fine.

In preparing for a stop on a road test, it has a grinding sound in the engine. We have taken the engine all apart again and reassembled it without locating the trouble.

Would appreciate any information you can give us on this.—C. A. B., Ariz.

We believe that the knock may be attributed to one of several different causes

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

and it would be difficult for us to say positively just where the trouble is located. However, we suggest that you make a very careful inspection, giving particular attention to the following:

Note the piston pins to see if they are loose or not fitting properly.

Note whether there is too much end-play

or thrust in the crankshaft, due to worn bearings.

Examine the camshaft bearings or bushings for excessive wear.

We assume that the crankshaft is in good condition and that the bearings and connecting-rods have been properly fitted; also that the pistons and cylinders are in good shape and do not show excessive wear.

You might also check up the valve stems and note that each has its proper clearance, as an extraordinary amount of clearance between the valve-stem and push-rod develops a very sharp knock.

As to the grinding noise you mention, we suggest that you examine the clutch for worn bearings or bushings. Also see that the channels of lubrication are feeding properly and not stopped up.

* * *

Gear Shift Trouble.

I have a 1921 model Dort car that is giving me trouble in shifting gears.

I have had it to the garage several times. It will work well for some time, then the same trouble comes back again. Two speeds seem to mesh at the same time; that is, the shifting lever appears to engage one gear before the other is thrown out and, when the clutch is let in, it stalls the motor.

The only way I can release the gears is to remove the cover of the transmission and pry the gears out of mesh with a screw-driver or drive on the shifting forks with a hammer.

Could you advise me how to eliminate this trouble?—G. E. P., N. Y.

We believe your trouble in shifting gears is caused by the failure of the lower end of the shifting lever to properly manipulate the shifting forks in the transmission. This may be caused by the lower end of the shifting lever being bent or otherwise out of shape.

Perhaps a burr may form on this part of the lever where it fits into the shifting forks, causing both forks to move at once.

The adjustment of the shifting forks on this car is permanent and we do not believe the trouble is with the forks.

* * *

Battery Trouble.

I have an Exide storage battery that has been used about seven months. The generator on the car is charging all right and the headlights seem quite bright. Two of the cells of the battery show a specific gravity of about 1.200 and the other cell shows practically nothing. The battery is not strong enough to operate the starter.

Could you advise me why this third cell of the battery does not charge up with the other cells of the battery, and whether a battery of this age should give this trouble?

This battery has always had plenty of electrolyte or liquid over the plates and does not leak.—G. E. P., N. Y.

We suggest, from your description of the trouble with the battery mentioned, that

perhaps some of the wood separators between the plates of the weak cell have become perforated, causing a short circuit of the plates in this cell. These wood separators may be replaced at a reasonable price at a battery service station.

This trouble sometimes occurs in all batteries using the wood type of separator between the plates.

* * *

Clutch Trouble.

Can you tell me, through your magazine, what to do for clutch grabbing? The car seems to be in good shape otherwise. I shall appreciate any help you can give me.—A. B. L., Cal.

Grabbing may be caused by facings which have become rough and dry; by an adjustment that is too tight; by too heavy spring pressure; or there may be end play in the clutch shaft. If the clutch is jammed in, it is very likely to produce a grabbing action.

In this trouble, which is the opposite of slipping, the clutch takes hold too suddenly, so that the car is jerked in starting and unnecessary strain is involved for the entire power transmitting mechanism.

* * *

Electrodes of Spark-Plugs Burn.

Please tell me what causes the electrodes to burn off spark-plugs in my Case engine. It has a high tension magneto and, if I put in new plugs, in about three or four hours they are burned off completely.—H. A. P., N. Dak.

The burning off of the electrodes of the spark-plugs is rather an unusual occurrence, especially in so short a time.

You do not say whether the magneto has the impulse starting device for easy starting. If it has and has become deranged so that it works continuously, this would hasten the burning away of the electrodes of the spark-plugs, but it does not seem possible that they should burn away in the time you mention even in such a case.

About the only suggestion we can offer is that you are using a very poor grade of spark-plug, the electrodes of which are of poor quality metal and unable to stand the heat.

* * *

Gear Changing.

We have an Overland model 81 automobile that we have converted into a motor car for railroad use. On account of the fact that the wheels are only 24 inches, we can not get the speed that we want without racing the engine to death.

Will you advise if we can get differential gears with two to one ratio? If not, can you suggest any remedy? The car runs fine and is perfect except for the fact that the motor has to run too fast to get any speed, and it is not possible to increase the size of the wheels.—F. E. W., Tex.

We believe that the changing of gears to increase the speed of the car for railroad use may be done. If you are unable to purchase the proper gears from the manufacturer of the car, you may purchase them from one of the manufacturers who

advertise in the columns of the AMERICAN GARAGE & AUTO DEALER, who make a specialty of the manufacture of the type of gears of which you are in need.

It will, however, be necessary for you to furnish them with the name of the car, the model, and other information that they may require.

You no doubt know that increasing the speed of the car in this manner will also reduce the power. However, you may have ample power for the work which you intend to do.

* * *

Removing Carbon.

We have a number of motor cars and trucks in use and have the usual trouble with carbon. We have tried different methods of removing it with kerosene oil and carbon removers but this does not seem to be very effective.

Could you advise us, through the AMERICAN GARAGE & AUTO DEALER, of some method of doing a more satisfactory job?—G. E. P., N. Y.

There are several ways of removing carbon from the combustion chambers of gasoline and kerosene motors. Some liquid carbon removers work out fairly well.

Perhaps the most positive way of removing carbon is by burning it out with a torch manufactured for that purpose. This is a quick and effective method. If you have considerable time in which to do the work, we recommend scraping the carbon out—either by removing the cylinder block, or if a detachable cylinder-head motor, by removing the cylinder head.

It is advisable to have the valves reground after the burning method has been used.

* * *

Ford Motor Misfires.

I have a Ford car that is causing considerable trouble by misfiring.

I have installed a new timer; also new wiring and contacts on the vibrating coils. The spark at the spark-plugs seems perfect. Still the motor runs unevenly up to about 15 miles per hour; above 15 miles per hour it runs fairly well.

The clutch pedal sticks down when released for high speed and I have to force it back with my foot.

Could you kindly suggest the cause of these troubles, through the columns of your paper?—E. P., Kans.

From your description of the trouble with the Ford motor misfiring, we suggest that there is perhaps a poor gasket between the carbureter and the manifold, or a defective gasket between the manifold and the intake ports on the cylinder of the motor. There may be a defective cylinder-head gasket, allowing water into one or more cylinders.

A poorly seating valve would also give you the trouble you mention. We assume that the adjustment of the carbureter is correct and that it is functioning properly.

Your trouble with the clutch pedal is no doubt due to one of the following causes: Binding against the side of the floor boards

of the car, or the band is badly worn, allowing the pedal to go forward too far and lock itself in that position.

This may be overcome by the proper adjustment of the band on low speed. If it is badly worn, a new lining will be necessary.

* * *

Motor Heating.

I have a used Hudson touring car that I bought recently. The motor runs fine until I have made 10 or 15 miles, at a rate of between 25 and 30 miles per hour. Then the radiator begins to steam and boil over. I have had the carbon removed and the valves ground, and my garage mechanic says the timing and ignition and the carbureter are all right and correct.

Could you advise me what can be heating the motor of this car?—R. M., Colo.

From your description of your trouble with the Hudson car, we suggest that it may be attributed to one of the following causes: Brakes dragging or improperly adjusted; hose connections in the water circulating system deteriorated or stopped up; pump out of order; or radiator passages stopped.

Sometimes, if a radiator has been leaking, some operators, instead of having it repaired properly, use some grades of cereal which they put into the radiator. This will close the passages of the radiator and stop the free circulation of the water around through the water jacket and radiator, causing the motor to overheat. This may be the cause of your trouble.

* * *

Adjusting Holley Carbureter.

Will you please explain the adjustment of the Holley carbureter for me? Any information you can furnish me will be appreciated.—A. V., Minn.

Adjustment of the carbureter should, of course, be made when the motor is warm. The correct adjustment lies between two extremes.

The idling tube connects, at its upper end with the plug, having a hole drilled off-center leading into the air passage. There is a screwdriver slot in the outer end of this plug, which permits its turning after the locknut is loosened. The location of the hole is indicated by a prick punch mark on the outer end of the plug.

You can readily see that if the hole is brought entirely above the closed throttle, the suction will be very strong and a considerable amount of gasoline will be drawn through the hole. If the hole is entirely below the throttle, the resulting mixture will be exceedingly weak.

Since the edge of the throttle rises quite rapidly as it approaches the closed position, it will be readily understood that the adjustment of the throttle stop screw will also affect the mixture as well as idling speed. The two should be adjusted together so that the engine idles steadily at the desired speed.

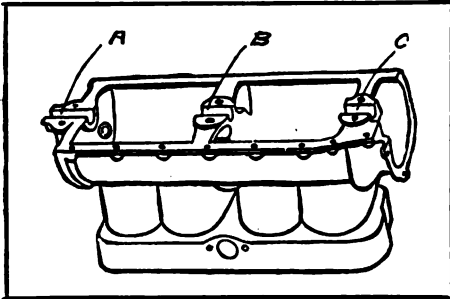
The idling adjustment has no effect on the running adjustment, except when the throttle is nearly closed. The only running adjustment is that of the needle valve.

My Experience With An Automobile

Do You Know How Many Repair Jobs You Can Do With the Aid of a Nokorode Solderkit?—Even the Small Boy in the Story Found Soldering Easy When Given Instruction Booklet—Nokorode is Used by Garagemen to Build Business

By J. N. Bagley

Way back in the early nineties, a fellow came to our town and leased an old implement building and converted it into a roller skating rink by laying a new floor. And such a floor? That floor was ten times



Replacing Cylinder Bearings With Nokorode.

slicker than greased lightning and the skates were the most uneasy, contrary little wagons one ever tried to ride.

It is said that one's head goes down and his feet come up in the Great Salt Lake of Utah because of the water being salty. I don't remember that the skating rink floor was salted, but most certainly my head went down and my feet up. I shall never forget it—neither shall I forget a 15-mile walk only last August, over sands so hot that sand lizards ran with their tails sticking straight up, and I doubt if they even stopped for breath until after sundown.

It was on this memorable day in August that I learned the art of soldering, and from a woman too—a woman who lives out on the wind-swept plains of Furnace county, just a common, ordinary housewife, about 4½ feet high and just about as broad. I won't attempt to tell her weight, but you may judge from the sketch.

About nine o'clock in the morning, on the 28th of August, I drove into Wellfleet and inquired the road to a little village some 40 miles farther to the northwest. There being no laid-out roads, it was very hard for anyone to give directions that a native could understand. Imagine someone trying to get a line on the road who was not familiar with landmarks, etc.

The merchant at the place gave me the direction, as nearly as I can remember, something like this:

"Go northwest up this road leading out of town until you come to the forks, take the center fork and follow it until you come to two windmills and turn up the valley,

taking the left-hand fork near the school-house and follow this one to within about one-half mile of a haystack on the hill. Then go straight north across the valley," etc.

I started. Some one had evidently moved the stack of hay for I never did find it, and gates through fences—I opened enough that day to fence a state, if they had been tacked together in a straight line.

The last gate I came to was on a sidehill and I jumped out, leaving the engine running, and started around to the front of the car. Somehow the emergency brake dropped forward, and the bar beat me to the gate and went right on through. The wire punctured my radiator in a dozen places and all the water soon leaked out. There I was 30 miles from nowhere, not a house in sight or a telephone in the country that I could find.

I followed a trail 10 or 15 miles and found a sodhouse standing alone on the hillside. I hired the farmer to take his team and go for the car with me. When we got back, it was drawing near the close of day. When we came into the yard a boy

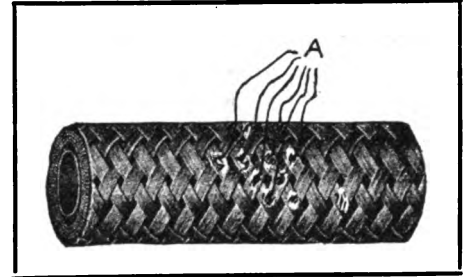


"Pa Got That Little Outfit Down to Kansas City."

about ten years of age came out—alive with curiosity. I doubt very much if he had seen many automobiles, for he didn't even know it was a Ford.

Copyrighted 1921. by Frank Chapman.

Boy-like he wanted to know why it wouldn't run. I explained to him my experience with the barbed wire fence and how I would have to have my machine towed to a garage or repairshop some place.



Repairing Rim Cut in Air Hose.

The chap got 'down in front of the radiator and scrutinized it very closely.

He rose to his feet with a grin that was at least three inches long and remarked: "Gosh! Ma can fix them little holes. She fixes all the milk cans, pails and other things around our house."

Before I could answer, he had dug his toes into the sand in the road and was halfway to the house. In about a minute he came back with the same grin on his face. "Ma will be here in a minute and she can fix them little holes in just no time." "Ma" came in a few minutes and the lad stepped over to me and said: "Mister, this is my ma."

"Mighty glad to see you," remarked the woman. "We don't see many folks out here—er—I mean only our homefolks."

By this time the lad had pointed out all the little holes in the radiator to his mother. "You can fix them, can't you, ma?"

"I sure can if we can stand that thing up on its back end so I can get to it."

I told her I could remove the radiator in a few minutes, if she wanted to try it. She was just as confident as the boy that she could fix it up. So I removed the radiator and she started back to the house, telling me to bring the radiator along when I got it off. In about 30 minutes I had it off and up to the house, lying on the floor.

She lighted the kerosene stove and getting down a little tin box, took out a soldering copper and placed it over the fire. While the iron was heating, she cleaned

around each of the holes and applied with a small stick a little paste. Next she got out a little wire solder and all was ready. She removed the copper, touched the point of it to the solder, and carried the small drop over and placed it on the punctured radiator.

In about five seconds she removed the iron—and the hole was gone. In about five minutes, every hole was fixed and we filled the radiator with water to test it out. Not a single drop did it leak. The lad stood idly by looking on, and when I pronounced it done he remarked: "Didn't I tell you ma could fix it?"

That woman was a wizard with that little soldering copper, and I asked her where she learned to solder. "Don't take any learning; all you need to do is to read this little book," she replied as she handed me a little sheet from the tin box where she kept her outfit. The front cover read, "How to Solder. Suggestions from users of Nokorode."

"I never had a soldering iron in my hands until about two weeks ago. Pa got that little outfit down to Kansas City when he went to sell his cattle. Only took about 15 minutes to read the instructions and I went to soldering. I soldered up holes in about a dozen pans and fixed three or four milk pails, besides a lot of other little things in the kitchen."

After settling up everything with the folks, I asked for the little Nokorode booklet, telling her I would mail it back to her. "Don't need to bother," she replied, "our storekeeper down at the Forks store sells this little outfit now since he heard about mine."

On my way back home I stopped at a garage to have a gasoline pipe soldered. "Don't do any soldering here; takes a tinner to do that kind of work." I finally persuaded him to soap the crack and wrap it with tape and started on.

I stopped at seven garages, one after the other, before I found one where soldering copper was a part of the tool equipment. The last garageman got down a bottle of acid and cut small pieces of zinc and dropped into it until it boiled all over the bench and the fumes nearly choked everyone in the place. In an hour's time he had me fixed up. I shouldn't say fixed, rather daubed up, for it was the worst looking job I ever saw to be done by a mechanic. He had spent more time on that little pipe than the woman had spent on the radiator and his job looked like a mess alongside of her neat work.

I had always thought, just like this garageman, that soldering required special training, etc., for I can remember seeing my father with a piece of resin in one hand and soldering copper in the other, chasing a drop of solder over a pan trying to get it to stick. Sometimes he would succeed—and sometimes he wouldn't, and it was from his experience that I got the idea that only a few people could learn the art of soldering.

Immediately upon my return home, I purchased a Nokorode soldering kit, determined to find out for myself whether anyone could solder or whether that woman was an exception, and I found out to my own satisfaction that I could solder just as well as anyone.

My neighbor had a small boy, a little past eight years old, and I called him over and gave him the little book on "How to Solder with Nokorode" and asked him how long it would take him to read it. He looked it over and said if he didn't find too many big words he would read it in a little while.

"Now, John, you read that just as quickly as you can and then bring it back to me."

GET BEHIND AND PUSH.

If you want to get on the right side of the man who foots the payroll—get at the rear end of your job and push forward. Exhaust the possibilities of your position. Don't exhaust your energy by thinking about things that ought to happen, but don't.—A. W. Shaw.

I have something I want you to do and I'll give you a quarter if you do it."

In less than an hour John was back smiling. "What about the quarter?"

"Oh, yes, Johnny," I replied, "I must have forgotten about that quarter business. I have here a tin cup with the handle off and a small hole in the bottom. Now, you take this Nokorode solderkit, light the gas stove and put the handle back and solder up the hole and I'll give you the quarter."

"I believe I can all right," Johnny replied, as a knowing smile crept over his face."

I left the room so my presence would not bother him in case he made a bad go of it, thinking I would stay away at least 30 minutes and then go back. In less than 15 minutes Johnny came out hunting for me, carrying the tin cup in his hand with the handle on and the hole soldered up.

To convince myself further that Nokorode was responsible for his and my success as soldering artists, I had seven other lads read the little booklet, "How to Solder with Nokorode," and every single one of them could put the handle on a tin cup and solder up the hole in the bottom. I was no longer in doubt.

A friend of mine runs a small garage in my town. One day I happened to be in getting some work done, and in putting away some tools noticed my Nokorode solderkit—I always carry it in the car.

"Ever do any soldering, Charlie?" I asked.

"No, and more than that I am not going to either. I had a fellow here last summer who fooled around with acid and stuff and rusted all the tools in the house until I never did get them cleaned up again."

While we were arguing soldering, pro and con, one of Charlie's customers came in with a gasoline tank under his arm and

wanted it soldered. Before Charlie had time to answer, I stepped up and said: "Bet your life, Marsh, we are artists at the soldering game. How soon do you want it?"

"Oh, about an hour, I expect," was the answer and out he went.

I got out my torch and Nokorode solderkit, cleared the seam and put on a little paste. When the copper was good and hot, I took the wire solder, ran down the seam just once, and it was all over. Charlie looked on.

"I'll be durned," he exclaimed, as he picked up my solderkit. "Is that all there is to it?"

"Absolutely, Charlie. The trouble is you have never got hold of the right material to work with before, that's the answer."

Charlie took the copper and fooled with it a few minutes. It was nearly two weeks before I was back in the garage; the first thing I saw when I went in was Charlie soldering a radiator.

"Thought you didn't do soldering here, Charlie?"

"Any darn fool can solder with this Nokorode. I got a dozen by express. I've made \$26 this week besides this job, and I'll get about \$3.50 out of it. See that thing over there?" he asked, as he pointed to a tin windmill. "My 12-year old boy made that and I never even told him a thing."

"Just as I told you, Charlie; no trick about this soldering if you have the proper layout."

I spend a great deal of my spare time about Charlie's garage and watch him solder. Here are a few jobs he does and the way he does them. If every garage mechanic who has the same opinion of the art of soldering as Charlie and myself have had will try them he will be convinced that any one can solder anything, any time, any place.

Charlie has had unusual success re-babbitting connecting-rods and Ford cylinder blocks. Take the country over, not many of the boys are successful in placing new babbitt linings that will stay and give service. Quite often I have heard customers come into a garage with a connecting-rod bearing melted out and the first thing they would say was: "Don't want any re-babbitt job, use a new rod." Why? Simply because they did not do the job as it should have been done and in a very short time the bearing would be threshed out.

Now, with Charlie, it is different. They come into the shop with a rod burned out, and the first thing they say is: "Run a bearing like the one you run for Smith or Jones over in my neighborhood." The reason is—Charlie knows how to do the work and has the proper material to do the job with.

In the first place, he takes the old rod and re-tins the surface so, when the rod is well warmed and the metal run in, it becomes a solid unit. This is a simple matter. He first wipes it dry, and warms it just enough that it cannot be held in the hand. He then applies a little Nokorode to



Established 1854

TWO STAGE EFFICIENCY *is* INTERCOOLER EFFICIENCY

Refuting Misleading Claims

*as to Horse-Power
and Capacity Ratings
of Two-Stage
Air Compressors.*

As manufacturers of BOTH Single-Stage and TWO-STAGE Air Compressors (therefore unbiased), we desire to go on record to the effect that—

1—Claims that a Two-Stage Compressor will compress anywhere from 15% to 50% more air with the same horse-power;

or,

2—That Two-Stage Compressors will compress the same volume of air with 15% to 50% less horse-power

are absolutely misleading statements, not supported by facts.

During our sixty-seven years of business existence, we have never sold our product by misleading statements or unsupportable claims.

TWO-STAGE Compression permits the heat generated by compression to be reduced in the intercooler between the low and high pressure cylinders, the high pressure cylinder thus handling a greater volume of the cooler and denser air. Thus the efficiency of a two-stage compressor depends directly on the degree of intercooling effected.

Curtis Intercoolers are made of COPPER Tubing, with thin COPPER Radiating Fins rigidly attached. This insures radiation 135% greater than cast iron. Excepting gold and silver, copper radiates heat faster than any other metal.

Curtis Engineers have been the only ones alive to the advantages of a COPPER Intercooler and the fact that the efficiency of the intercooler determines the efficiency of a Two-Stage Compressor. The COPPER Intercooler is but one of the many ORIGINAL features of the CURTIS TWO-STAGE Compressor.

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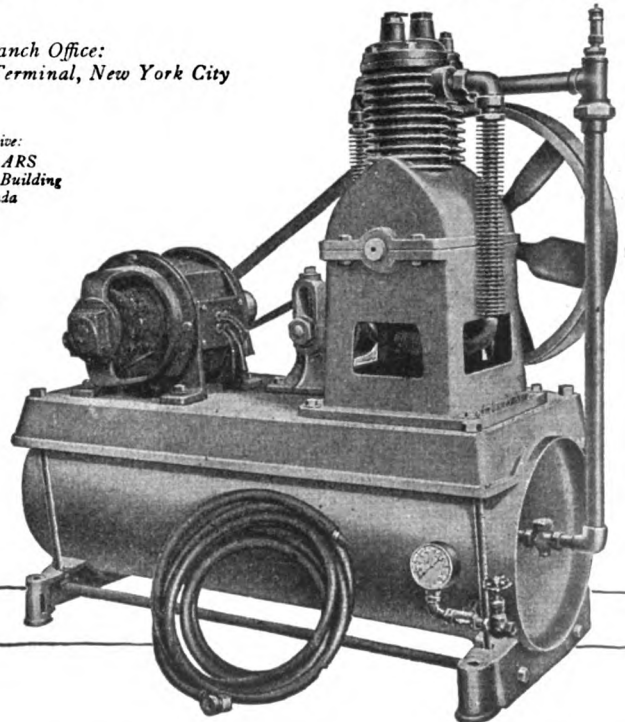
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JOSEPH ST. MARS
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Style "V" Two-Stage

Furnished with 3-4 or 1 h. p. motor. Automatic starting and stopping device, including Curtis Centrifugal Unloader, extra. Starts against no load.



the surface and applies the solder with a large well-heated copper. The solder flows like water when it is ready for babbiting the usual way. I have yet to see a bearing thrashed out that was put in this way.

The cylinder block, as shown in Fig. 1, has three bearings that need replacing quite often due to lack of lubrication, etc. He thoroughly tins the surfaces at A, B, C, by applying a little Nokorode and flowing the solder about with a large well-tinned copper, and at the same time plying the flame of the torch in a circular fashion until the solder flows evenly. He then melts and runs the babbitt in the usual manner.

Only a few days ago a customer drove into his place with a tire off, and the steel rim cut the braided covering on Charlie's air hose. The customer jumped out, and seeing what he had done, offered to pay for it. Charlie was doing some soldering and had his copper hot.

"Never mind," returned Charlie, "such things don't bother me any more."

He placed a little Nokorode on the covering, touching the copper here and there as shown at A, and the covering was just as good as new.

The customer looked on with interest and remarked when Charlie had finished:

"I'd give a whole lot if I could handle a soldering copper like you do, Charlie."

"You can, if you have the right material. Now here," continued Charlie as he slipped to the showcase and handed the customer a small Nokorode solderkit, "you take this home and follow instructions. If you don't come back and tell me you can solder pans, kettles, buckets, etc., just as well as anyone, I'll make you a present of the outfit. But after you have tried it, you'll want to keep it—then I'll sell you the outfit."

The customer didn't wait to come to town, but about eight o'clock that evening, while we were sitting about the office smoking, the telephone rang and Charlie answered.

"Hello, Charlie, this is Ned Briggs."

"Yes."

"I just wanted to tell you to charge me with that solderkit. It is just what I've wanted. I have done soldering enough in the last two hours to pay for a dozen kits, and you need never be afraid to make anyone the proposition you made me, for if you find a man who can't solder with a Nokorode soldering outfit, it will be because he can't read or write."

"Glad to hear it, Ned," and just then about a dozen fellows butted in on the line for information. It was a party line with 10 or 15 subscribers. By the time Charlie and Ned Briggs had finished talking, Charlie had sold nine Nokorode solderkits to be sent by the rural delivery the next morning.

One thing that I have noticed with Nokorode in which it differs from many acid preparations used by mechanics is that it has no ill effect on tools when it is knocked about on the bench among them. I remember on one occasion my Nokorode

kit came open in my tool box and the paste was smeared over my wrenches, etc., but when I wiped it off, they were just as bright and nice as though it had been vaseline or oil.

Only a short time ago, the jeweler came into the garage with his car to have some work done on one of his springs. Charlie was busy at the bench with his soldering iron. The jeweler watched him for some few minutes and wanted to know what he was using that made his solder flow so nicely, seemingly just where he wanted it, without the least bit of trouble. This was Charlie's opportunity, for he got in his work when folks became curious.

In a few minutes the jeweler went out with a Nokorode solderkit under his arm. The jeweler found it ideal for much of his soldering, especially about clocks. I heard him tell Charlie a couple of days ago that there were two things about Nokorode that he liked. One was that solder would go where he wanted it to go without a lot of trouble, and the other was the fact that he could leave it on the bench and knock it about with tools without its causing any ill effect.

The writer keeps his Nokorode solderkit in his tool box, and scarcely a week goes by but what it is used from one to three and even six times. About the house it is invaluable for soldering pans, kettles, etc., as a woman can handle this work just as well as anyone at the tin shop. If I were to enumerate all the things that can be done with Nokorode, I would have a book about the size of Webster's dictionary, but if all garagemen will try it, even though they don't know a thing about the art of soldering, they will be just as greatly surprised as I was when the lad told me, "Ma can fix that."

After reading a little booklet that takes just 15 minutes, no one need be afraid to tackle a radiator, gasoline tank or what not, for he can do it just as well as the man who has soldered for years—and you will agree with the writer when you have tried it.

WELDING, CUTTING AND BRAZING PRACTICE

(Concluded from page 24.)

If the welder persists in drawing out the last ounce after the pressure gets low, he will only spoil a weld for his pains. It is better to pay strict attention to the manufacturer's instructions, since an allowance has already been made for unused acetylene. Here let us reiterate: Always close the valve securely when the tank is empty because the acetone will evaporate if the valve leaks.

We have now covered the subject of acetylene tanks quite comprehensively with the exception of instructions usually furnished by the manufacturers applying to their particular make of tanks, such as tables for ascertaining the amount of gas used, the proper amount for certain jobs,

instructions for returning empty tanks, and other miscellaneous matter usually obtainable in printed card form.

The writer has not attempted to go into this, nor will he in future articles. The main idea is to furnish plain, everyday instructions which the average welder usually has to learn by experience. The average welder has no time or patience with such things as moduli of elasticity and coefficients of expansion.

The next article will discuss acetylene generators, their installation and care insofar as the small one-man shop is concerned. Save all the articles and you will have a complete book on automotive welding.

New Plant Which Delights to Puncture Automobile Tires.

Nature's adaptability in fitting plants to new methods of spreading their seeds is apparently illustrated in a noxious weed which has recently become troublesome in California and has spread to Arizona. It is known as the puncture vine.

Its activities in Arizona, where it is commonly called Devil's Bur, were revealed to the United States Department of Agriculture during a nationwide weed survey now in progress. This vine produces spiny seeds which attached themselves to automobile and bicycle tires which carry them long distances. It is not only an opportunist but an ingrate, because it is causing widespread trouble to motorists and cyclists by puncturing their tires.

The possibilities for damage from this plant are illustrated by the experience of a California man who was reported to have had 70 punctures in one tire, all due to the puncture vine. The weed is considered so serious in California that the California State Department of Agriculture has published a number of special articles on the subject.

The sections lie on the ground in such a manner that one of the spines always points upward, ready to enter the first tire that comes along.

The burs also cause severe damage to wool. The plant has been known as ground bur nut, caltrop, and has recently received the apt name of automobile weed. In addition to California and Arizona it has been reported from Indiana, Iowa, Illinois, Nebraska, Kansas, Arkansas and Texas.

Hope for its eradication in fields is given in the fact that it is an annual and can be controlled by repeated cultivation, thereby preventing the formation of seed. Along roadsides, however, the plant can not ordinarily be controlled by mowing on account of the low, spreading habit of growth. Even after being closely cut, burs are apt to form on the ground.

Department experts are planning to test the possibilities of exterminating the plant along roadsides by spraying with chemicals such as crude oil or iron sulphate.



Winter radiator troubles will soon be with us again. Why not definitely eliminate all Ford radiator damage by the use of JAFJE radiators? JAFJE is the only radiator in the world which not only carries an ironclad guarantee against freezing injuries with free replacement in case of such trouble, but also has \$100.00 reward waiting for anyone whose JAFJE core is so damaged.

DEALERS In authorizing this guarantee and reward, the JAFJE RADIATOR COMPANY has taken a step absolutely undreamed of before. This is done for *your* benefit. It puts in *your* hands the greatest selling feature ever offered. If your Jobber can not supply you, write us.

“It’s the Patented Construction!”

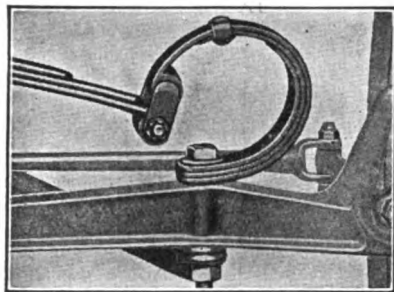
JAFJE RADIATOR COMPANY
741 W. Van Buren St., Chicago, Illinois

Accessories—Dealers' Key to Profits

Indiana Parts Co. Offers New Ford Shock Absorber.

"Grey Goose" is the name selected by the Indiana Parts Co. for the new Ford shock absorber it is placing on the market. The name is suggested by the goose-neck design of the accessory.

The Grey Goose is made in two types, one for front Ford springs and one for the



Leaf Spring Construction is Used.

rear springs. The action is the same; the difference of design is for the purpose of fitting.

Leaf-spring construction is used, the material being chrome vanadium steel. The design is said to allow free action of the springs while damping and checking the rebound. The eyes are bushed, reamed and drilled for oil cups. The set of Grey Goose shock absorbers can be applied by anyone in from 45 minutes to an hour with a monkey wrench, the manufacturer states.

Salesmen and distributors are now being appointed for territory not already covered. Further particulars and trade prices can be obtained by writing the Indiana Parts Co., of Richmond, Ind.

Users Express Approval of the Ever-Tyte Piston Rings.

Early in the year, Thomas H. Ness, superintendent of electrical distribution of the East St. Louis & Suburban Railway Co., wrote to the Ever-Tyte piston ring manufacturers and this is what he said:

"We have installed your piston rings in five of our Ford cars and are obtaining wonderful results from the use of these rings in the way of less oil and less trouble in carbon deposits and dirty spark-plugs. We intend to eventually equip all of our machines with these rings."

And on August 1, 1921 the railway ordered 100 rings!

Then, C. V. Koehler, mechanical engineer of the Booth Fisheries Co., of Chicago, wrote: "In the future, for any new piston rings which we will require, I will not hesitate to recommend to our company to purchase Ever-Tyte piston rings, as they apparently give entire satisfaction, wherever used."

These are only two of the thousands of letters expressing approval and satisfaction in regard to the Ever-Tyte piston rings.

Installed in any motor, engine, pump compressor, or the like, the Ever-Tyte piston rings, will, the manufacturer says, more than pay for themselves in the greater power delivered and the great saving of fuel and oil.

The manufacturer also claims that the Ever-Tyte ring is so designed that its radial expansion is perfect. A patented right-angle interlock seals the joint between the three parts in the construction. The rings are machined from fine-grained, springy gray iron and hug the cylinder wall closely without binding. They are also said to fit out-of-round cylinders as well as true ones, and to act as safeguards against imperfect combustion with resultant carbon deposits—against a smoky exhaust resulting from oil leaks. They are gas-tight, oil-tight, and elastic.

You will be interested in obtaining trade prices and more complete details. Write to the Ever-Tyte Piston Ring Division, Walter A. Zelnicker Supply Co., 1600 Kingsland Ave., St. Louis, Mo.

Are You Acquainted With the Jaffe Radiator? "It's a Dandy."

Are you, Mr. Dealer, familiar with the Jaffe Ford replacement radiator? If you're not, then you will want to hear that "It cannot be damaged by freezing," for that is the guarantee of the Jaffe Radiator Co., its manufacturer.

And not only that, but it is guaranteed by its manufacturer against defective workmanship and materials, and many details are given as to its excellent qualities.

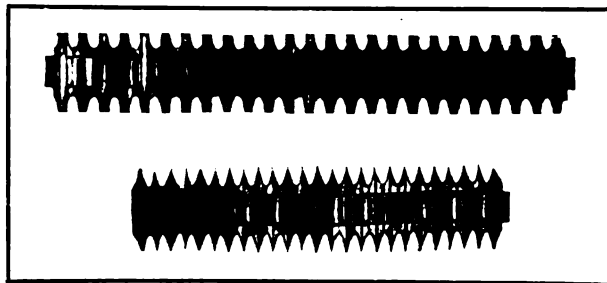
The core construction of the Jaffe is of the honeycomb, cellular type, providing



Core Construction Gives Elasticity.

elasticity and resiliency. Water tubes are of No. 36 gage brass, about 5/1,000 of an inch in thickness. These tubes are rolled, and "rolling," it is claimed, preserves the natural springiness of the metal without weakening it.

The absence of sharp angles and corners



"Fins" Add to the Strength of the Core.

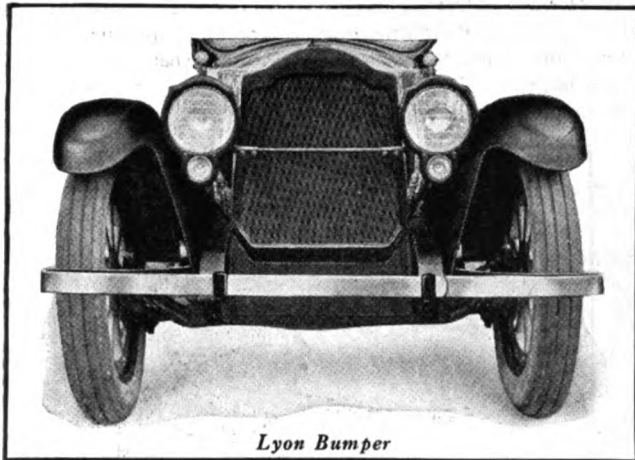
in the construction prevents clogging, which so often impairs radiator efficiency. Augmenting the cooling surface of the tubes and adding to the strength of the core are spacers or "fins," strips of metal lying between the water tubes and forming an intrinsic part of the core. They are said to draw heat from the side wall and aid radiation. There is no internal soldering about the "Jaffe."

The hexagonal, cellular construction and the naturally resilient rolled brass provide enormous strength and great flexibility, which enable the "Jaffe" to withstand violent shocks and incessant vibration. By this flexibility, it is claimed that all danger from cracking and bursting, if the water freezes, is eliminated.

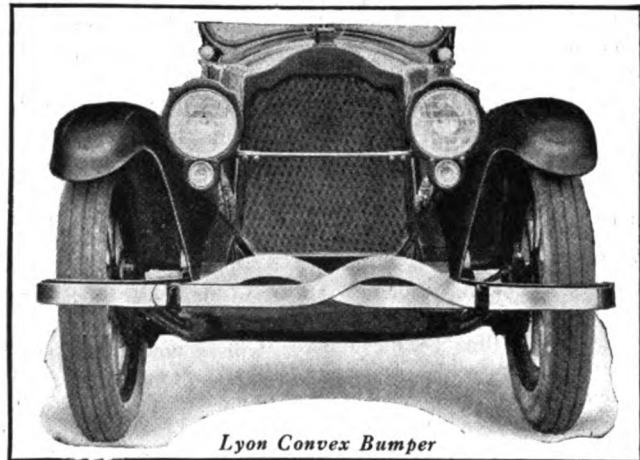
Tanks of this radiator are made of one-piece brass stampings, designed to eliminate weaknesses at angles. The side brackets also deserve special mention. They are of one piece, heavily-coppered, strip steel. They are "sweated" to the top and bottom tanks around their edges and through the holes in the brackets punched for this purpose, which materially aids in giving an everlasting grip. They are not soldered to the sides of the core. The strength and resiliency of the supporting arm of the bracket, which is of double thickness, and also oval holes make the radiator easy to fit to the frame of the car when adjusting in place.

Symmetry of the core construction gives beauty to the appearance. The black-enamelled shell is of pressed steel; all joints and angles subject to severe strain or damage are reinforced; from outlet to neck and cap, strength and durability are said to be paramount.

As a proof of its faith in the Jaffe, the manufacturer has taken an interesting step in offering \$100 reward to any one who can prove that the core of this radiator can be damaged by freezing.

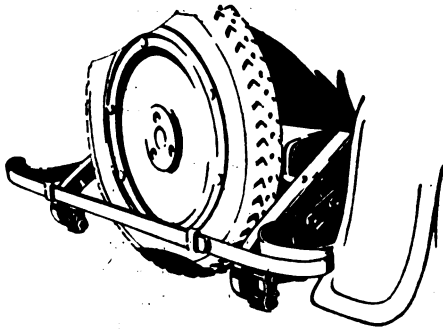


Lyon Bumper



Lyon Convex Bumper

More sold than all others Put Together



Lyon Bumpers are quickly and easily attached to any car, even when equipped with Snubbers. No alteration is necessary.

List prices of the regular Lyon Bumper range from \$10.00 to \$17.50, according to size and finish. The Lyon Convex Bumper, having all the bumping advantages of the regular Lyon Bumper plus an unusual design, lists for a slightly higher price.

The special Lyon Bumper for Fords lists for \$10.00 to \$13.00. Will fit Fords equipped with Hassler Shock Absorbers.

THE reason is this! Lyon Bumpers are the original all-spring, resilient bumpers, and are manufactured under the basic Lyon patents. They yield to the force of the blow like a spring, absorbing it, instead of passing it along to the car. *No other bumper built will take so stiff a blow without replacement.*

We guarantee the Lyon Bumper to withstand a blow at 15 miles an hour without damage to itself or the car. For years, we have publicly demonstrated this fact by *actual bumping*.

The famous Lyon *patented* opened loop-end construction is responsible for such remarkable resiliency. No matter what part of the bumper is struck—or *from what angle*—the looped ends give, taking up the shock, and then spring back into shape.

Lyon Bumpers are the easiest and most logical things in the world to sell—either to the purchaser of a new car or the owner of an old one. They afford the finest collision protection it is possible to secure. They add materially to the car's appearance. They are actually paid for by insurance companies through a reduction in collision rates on Lyon-protected cars—10% for front bumpers and an additional 2½% for rear.

So it's practically as easy to sell two Lyon Bumpers as one—thus affording complete Lyon protection and, incidentally, *doubling your profits on the transaction.*

And here's another point! We can make prompt deliveries through your jobber. Last year—even when business generally was at its lowest ebb—we were unable to keep pace with orders. Now, however, we have quadrupled production, bringing it up to 5000 Lyon Bumpers *a day*.

CAR DEALERS—Tell your jobber today that you want a stock of Lyon Bumpers. If he doesn't handle them, advise us and we will ship you direct and bill you through him.

JOBBERs—If you are not already handling Lyon Bumpers, communicate with us. Our new manufacturing and merchandising plans will certainly interest you.

Metal Stamping Company, Long Island City, New York

LYON RESILIENT BUMPERS

This is undoubtedly the first time that any radiator manufacturer has actually come out and offered a flat reward to anybody who can prove that core damage by freezing to one of its radiators is possible.

All those who wish more complete details concerning the Jaffe should write at once to the Jaffe Radiator Co., 741 W. Van Buren St., Chicago.

"Through the Window" of a Wholesale Accessory Dealer's Shop.

One of the well-known, wholesale accessory dealers in New York City, Chas. E. Miller, has for some time been conducting a window campaign which is attracting wide attention. On certain days his windows are devoted entirely to the showing of a particular product or group of products.

In the accompanying illustration is a well-arranged window which features the products of A. Schrader's Son, Inc., of New York.

Mr. Miller, whose general offices are located at 231 West 54th St., established his business in 1896. His organization occupies an entire building containing 18,000 feet of floor space. A ground floor sample and salesroom is maintained.

"If you came to New York for automotive purposes, you would have to come within five blocks of our place of business," Mr. Miller states. "There are about 2,000 manufacturers or their representatives of the automotive industries whose offices are within five blocks of our place of business."

Krasberg Company Perfects New Quick-Seating Piston Ring.

We are informed that the Krasberg Piston Ring Co., long identified as the manufacturer of the well known side-expanding V-Plex piston rings, is now marketing a new ring of the one-piece, quick-seating

type which is to be sold in conjunction with the V-Plex.

The Krasberg Co. states that in recent years a large demand has been noted for rings which will quickly seat to the cylinder walls so that the motorist does not have to drive 400 or 500 miles before he begins to get results. The Instanseat ring was designed to meet this demand and, it is said, is meeting with the approval of mechanics and dealers wherever it is used.

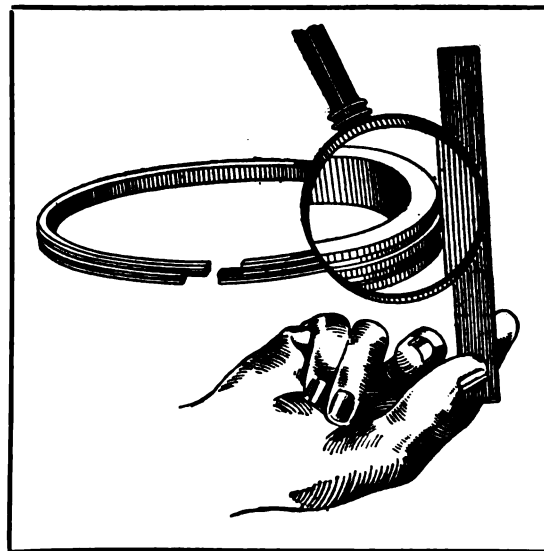
The particular feature distinguishing the Instanseat ring is indicated in the illustration. It will be noted that there are three raised surfaces or projecting ledges on the face of the ring, of which the center ledge is the highest or $1\frac{1}{2}$ thousandths of an inch higher than the next highest or top ledge which, as illustrated, is the second to come into bearing on the cylinder wall and is also an equal amount higher than the third or lower ledge.

The full pressure of the ring, when first installed, comes on the center ledge which is also the narrowest. Since this surface is "turned" instead of being "ground," it wears away where the cylinder wall bears the heaviest—should the cylinder wall be slightly out of round—thus seating almost instantly. This permits the next highest ledge which, as stated, is only $1\frac{1}{2}$ thousandths lower, to come into contact with the cylinder wall.

The pressure of the Instanseat ring is then distributed over a greater surface and the seating or wearing-in is consequently proportionately retarded. Thus, as can readily be seen, it now takes longer to wear down the two ledges until the third or lower ledge comes into contact with the cylinder and becomes seated.

Following this description, it will be seen that the seating on the center surface is extremely rapid, after which the pressure is distributed over a larger bearing surface and this greatly reduces the wear.

The Instanseat rings should be fitted with ends butting, but so that they may be in-



Construction Permits Rapid Seating.

serted into the cylinder without forcing because, as they "wear-in," the rings open up at the gap just enough to provide the clearance needed for heat expansion. After seating, they are the same as other rings fitted with proper clearance and lapped in.

As will be noted in the illustration, there are also two slight depressions between the raised surfaces of the Instanseat ring, and these retain a film of oil during the seating process, thus acting as oil seals.

Because there are no technical features embodied in the Instanseat rings, the repairmen and dealers are quick to see the advantages in the ring, particularly for giving immediate results to their customers.

The Krasberg Piston Ring Co., 536 Lake Shore Drive, Chicago, will gladly furnish further particulars to those interested upon request.

"Yale" Band Oiler Will be Appreciated by Ford Owners.

A Ford transmission case going downhill may mean that an insufficient supply of oil is reaching two of the most important bands—the brake and the low gear.

This condition may be overcome, it is claimed, by the use of a simple but very effective device, known as the "Yale Band and Transmission Oiler for Ford Cars," which has been placed on the market recently by the Yale Corp., 604 I. W. Hellman Bldg., Los Angeles, Cal.

The "Yale" oiler is designed to direct the oil to the parts where it is most needed—not too much or too little. It is claimed that it will:

Make old brake-bands work like new; make band renewals unnecessary; prevent



Well-Arranged Display Window of Chas. E. Miller, New York City, Features Schrader Products in an Attractive Manner.



A Big Business Booster

Boy and Slate
SIGNS
Make
SALES
and
SMILES

Here is over six feet of the greatest attention-getting, sales-making, fun-producing novelty ever offered any dealer in any line.

This Boy and Slate Sign, on account of its great size, its four attractive colors and interesting sayings is making a hit with the public and producing sales for the dealer wherever it is displayed.

The unusual feature of this sign, outside of its size and "make-up," is the clever, witty sayings that are chalked on the slate. We furnish you enough of these sayings to last a whole year, changing them every other day. People stop, look and read these sayings and then come back for more. In the meantime you are getting the benefit of this publicity; you are making new friends for your business, and results are sure to follow.

The sign is over six feet tall, cut out to make it look natural. It is supported by frame work so that you can set it upon the curb or wherever it will attract the most attention.

There is nothing like this sign; nothing that will make you and your business so much talked of and thought about; nothing that will help to make sales.

Send Today for Our Offer!

Write for this sign and for particulars about our scientifically refined En-ar-co products, the satisfaction builders. Get our extremely liberal dealer proposition. We make En-ar-co Motor Oils, En-ar-co Gear Compound, White Rose Gasoline and National Light Oil (kerosene) which are the highest types of scientific refining on the market. Send the coupon in today.

THE NATIONAL REFINING CO.

National Headquarters H-731 National Building., Cleveland, Ohio
4 Modern Refineries—97 Branch Offices

THE NATIONAL REFINING COMPANY

H-731 National Building, Cleveland, Ohio

Please send me full detailed information as to your dealer plan, "Boy and Slate" and other advertising helps, and your liberal sales policy.

Name.....

Address.....

City..... State.....

I now sell.....

bands from hardening and glazing; save oil to the amount of one gallon or more every 200 miles; keep oil, engine and feet of driver cool; make the gear shift perfect; take the shake and judder out of stopping and starting; and make a Ford start smoothly and easily.

A satisfied user has written the manufacturer stating in connection with the Yale transmission band oiler that there is, at all times, a sufficient flow of oil over the transmission bands which keeps them always soft and pliable and does away with the hardened or glazed conditions which usually exist after a short time and which means unnecessary replacement of bands.

The Yale Corp. will gladly supply any further details desired upon request.

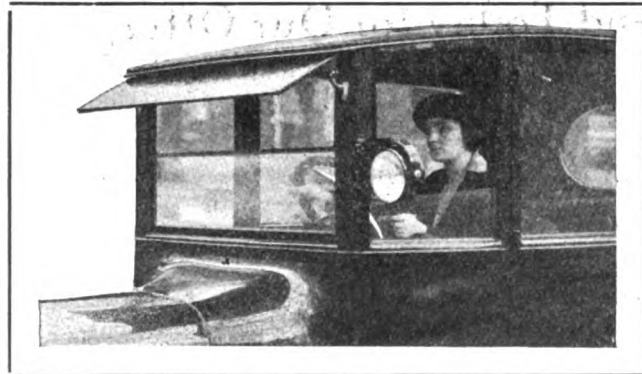
Car Upholstery Easily Cleaned With Dumore Vacuum Cleaner.

A new vacuum cleaner, designed and built primarily for cleaning the upholstery of closed cars, has just been put upon the market. It is known as the Dumore upholstery cleaner. Every owner of a closed car knows what a problem it is to get rid of the dust and dirt that settles in upholstery.

It is the most difficult kind of dirt to dislodge, and yet it quickly yields to the Dumore vacuum method. The powerful suction rapidly draws the grit into the dust sack as it is loosened from the upholstery.

The cleaner is portable, easily carried about from place to place, and convenient to operate. When in use it is placed on the ground outside the car, away from the operator, and does not interfere with his work. A ten-foot length of flexible hose is furnished, on the end of which is attached a swivel hand-grip or nozzle.

This construction permits freedom of motion at all angles, regardless of how much the hose is twisted about. The brushes, of China bristle and leather bound,



Saf-T-visor—Rattle-proof and Instantly Adjusted.

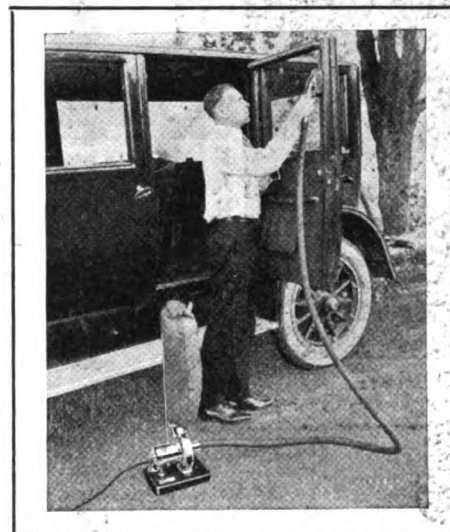
will not injure the most delicate fabrics. The motor is a Dumore universal type, and operates on either direct or alternating current. The base is hardwood, on which is located a kick type switch.

Many automobile owners find additional uses for the Dumore by carrying it into the house and cleaning upholstery, draperies

and garments. The cleaner comes complete with 25 feet of portable cord and an attachment plug. Its net weight is 13 pounds. Write the Wisconsin Electric Co., Racine, Wis., for further details.

Saf-T-visor Is Instantly Adjustable and Attractive in Appearance.

Announcement is made by the Toledo Wood Products Co., of Toledo, Ohio, of a new adjustable windshield visor of the non-breakable type, made under the trade



Cleans Upholstery of Closed Cars.

name of Saf-T-visor, designed to fit the windshield of any automobile manufactured, including coupes, sedans, touring cars, roadsters, etc., and to be sold at a very moderate cost.

It is claimed by the manufacturers that the Saf-T-visor consists of a carefully finished piece of thoroughly seasoned wood of accurate size, with metal fittings. The visor is heavily enameled in black on the exposed upper side and in dark, eye-resting green on the under side.

It is especially light in weight and of great tensile strength, assuring lasting service and obviating any chance of loosening the windshield glass or pulling the windshield frame out of place on account of excessive weight and constant "road jar."

It is further claimed that the Saf-T-visor is rattle-proof, instantly adjustable to any desired angle from the seat; has no sight-obstructing side brackets or braces; that rain drip is led to the sides by the special construction; and that it is easily and quickly attached or removed by anyone and the installation will not damage the finest car; that it does not interfere with the windshield or automobile top adjustments in any way. All fittings are enameled with the highest qual-

ity enamels, making a handsome appearance.

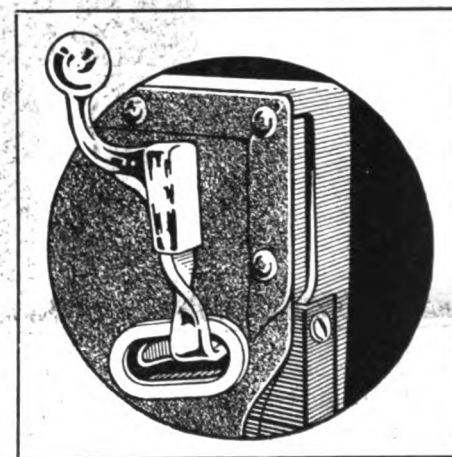
The manufacturers believe that they have produced a windshield visor that possesses every feature that the perfect windshield visor should have. It is an accessory of unusual "Safety First" importance and will add neatness, smartness and beauty to even the highest-priced cars.

Jiffy Handles Make Ford Doors Easy to Open and Close.

Obviously it does neither the door nor the handle of the Ford car any good to be continually jerked, pulled or kicked in opening or closing. Why not avoid skinned knuckles, torn clothing and an "out-of-kilter" door? There's a new device being marketed for that very purpose.

The Jiffy ball-grip handles for Ford doors are easily attached, as well as handsome in appearance, being heavily nickel-plated. They are designed to be slipped on over the standard Ford door handles, and are made to fit closely merely by a light tap with a small hammer. No bolts or screws are required. Whether going in or coming out, Jiffy handles are equally convenient.

Dealers will readily recognize the attractive possibilities offered by this useful



No Skinned Knuckles With a Jiffy.

accessory, which is being offered at a low price.

Details may be obtained by writing to the Peoria Novelty Co., Peoria, Ill.

Attractive and Complete Catalog for Automotive Trade.

It is often difficult to clearly, briefly, and accurately describe the special features of a catalog, its appearance, and style, but one does not lack words. It is merely a question of the choice of words when it comes to describing the Beckley-Ralston Co. Catalog 84, replete with the conveniences and necessities for all motordom that the dealer should have for his customers.

The Beckley-Ralston Co. has for over 25 years been serving dealers. It is a dealer's house and sells at wholesale only. Here may be found supplies and accessories for automobiles, trucks and tractors.

FEDERAL ELECTRIC SIGN



*How Do
Automobilists
Know Your
Garage
at Night?*



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

It is easy enough for them to find you if you have a Federal Electric Sign—an inexpensive form of advertising that really brings results. You can't afford to be without one, for you are losing prospective customers who pass you by without seeing your garage and patronize one that has a Federal Electric Sign lighting up the front. It instantly tells the automobile owner that he can have his wants supplied, and accordingly he will go direct to the garage that advertises for his patronage.

Made of porcelain enameled steel—will not rot, rust or fade and will last indefinitely. Costs but a few cents a day for electricity.

Gain a step on your competitor. Make a bid for the patronage that passes you by when your garage is dark at night. Get a sparkling electric sign. Send coupon today for full details, prices and **free sketch** showing how your sign will look.

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information price and free sketch of a Porcelain-enameled Steel Sign for my business. Explain your 12-months to pay plan.

Name City State

Street and No. Business

Store Frontage No. of Floors

AGAD-10

Give the AMERICAN GARAGE AND AUTO DEALER Credit When Writing Advertisers

garage and shop equipment, tools and hardware, and repair parts for all popular cars.

Catalog 84 contains 528 pages between its black and yellow covers. It is well illustrated—in fact profusely illustrated—contains a complete index, and information as to shipping regulations, selection of goods, foreign service, prices and discounts. Two supplements were also included.

All the well known products of the Beckley-Ralston Co., as well as hundreds of other supplies, are listed and accurately described. Trade prices are also given.

Copies may be obtained by writing the Beckley-Ralston Co., 1801 South Michigan Ave., Chicago. This book will prove a real textbook on automotive products. When writing for your copy, state whether you are an accessory dealer, service station manager, or jobber.

Baseball Fans Can Understand Why DuAl Gives Satisfaction.

Ever play baseball? Of course, you did. Then you will remember the motion used to keep the ball from stinging your hands and to relieve the shock from your body.

DuAl shock absorbers, for model 490 Chevrolet cars, are said to have the principle of this motion incorporated in their construction. The man who has played baseball will understand, therefore, why the DuAl Mfg. Co., 1424 Nicollet Ave., Minneapolis, Minn., believes it has built a shock absorber which will give the maximum efficiency and comfort.

As applied to the springs of a model 490 Chevrolet car, the DuAl shock absorber is designed and built to cushion the horizontal shock against the wheel and the axle. The vertical movement cushioned by the original spring is entirely independent of the horizontal movement cushioned by the DuAl, so that the combination of the two allows the axle to recede in

and allowing the axle to recede in the line or exact direction of the shock pressure.

There are two coil springs used on each absorber, the lower spring compressing when the car strikes rutty or rough roads. Then, as the tension is released on the lower coil spring, the upper coil spring receives or takes the tension which one can readily see prevents any rebound to the car. There is no weight of the car carried on the coil springs, the springs acting only when the car strikes rough spots, so the liability of coil spring breakage, it is said, has been reduced to a minimum.

In short, the manufacturer claims for these shock absorbers that they will give the drivers of model 490 Chevrolet cars real comfort at all speeds, save repair bills, increase tire mileage, stop rebound, save the body, protect the steering gear, prevent spring breakage, prevent shearing and loosening bolts, and save depreciation of the car.

Customers Served Promptly With Lyons Auto Parts Control.

"I know I've got one here somewhere," declared Mason as he searched through drawer after drawer for the Ford part for which his customer had inquired.

"It's a pity, Mason, that you can't keep your stock in some kind of order," grumbled the customer impatiently. "I haven't got all day to spend here."

The part was finally located and the customer departed, but he carried with him a feeling of irritation and dissatisfaction with service which Mason realized was not for the good of his business.

Leaning wearily against the counter and gazing somewhat despairingly after the departing customer, he said:

"I know he's right, and I'll swear I do try to keep my stock in order so I can get at things quickly but, try as I will, it seems I always have to search for just the articles people are in the greatest hurry for."

"There's a very simple remedy for your problem, Mr. Mason," said the man who had just entered the shop, and to whom Mason had been speaking.

"You'll earn my everlasting gratitude if you'll tell me what it is," promised Mason.

"Very well, here you are," replied the other, as he drew from his pocket an attractive looking circular. "This is a system which is known as the Lyon auto parts control and it is designed for the specific purpose of handling Ford parts rapidly and accurately."

"Each bin is numbered and every part is carried in numerical order in the auto parts control. The parts of each assembly are in one location, and anyone who can read a number can go directly to the parts he wants."

"Every compartment is just the size which is needed, the walls are of thin steel, and there is no waste space."

"Each section has extra compartments to provide for new parts or other needs. An auto parts control can always be kept up to date, as the factory has an engineering department which will supply sketches upon request to all owners, showing them how to arrange their units to provide for any additional or new parts they may need to carry."

"Another thing is that it eliminates loss of parts, as well as enabling you to tell in a moment just which supplies are low."

"Every auto parts control unit has been laid out according to the size and demand for the parts which it holds. The parts are adjustable and you don't need to adjust them. Each compartment has a metal number plate, giving the 'Ford' parts number of the part carried. The parts are carried in parts book order, assembly order and numerical order."

"There is a unit to take care of the Fordson tractor requirements, besides several sections to take care of parts of such unusual size as radiators, running boards and dust shields, wheels and rims, springs, front and rear fenders and radius rods."

"Well," said the dealer, "I'm glad you came in. Look my stock over and let me know just which style would be most suited to my needs and I'll give you my order. You've got an article there that's going to be mighty popular with Ford dealers everywhere."

The Lyon auto parts control is manufactured by the Lyon Metallic Mfg. Co., Aurora, Ill., who will gladly forward bulletins and other particulars, upon request.

"Esco" Double-Face Flaring Tool for Copper or Brass Tubing.

The "Esco" is a new tool for flaring either copper or brass tubing, being placed on the market by the Esco Mfg. Co., 228 Farnsworth St., Detroit, Mich.

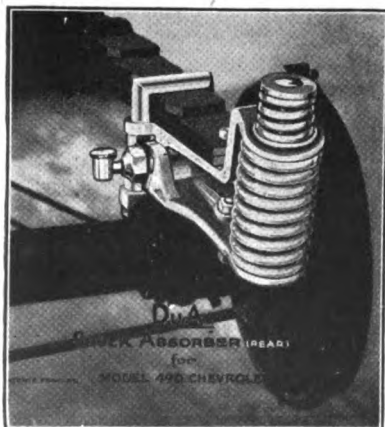
It is double-faced, self-opening, and with one blow gives the proper flare and taper to either copper or brass tubing in four sizes—3/16-inch, 1/4-inch, 5/16-inch and



"Esco" Is Double-face and Self-opening.

3/8-inch O. D.—without chance of splitting or cracking, it is claimed.

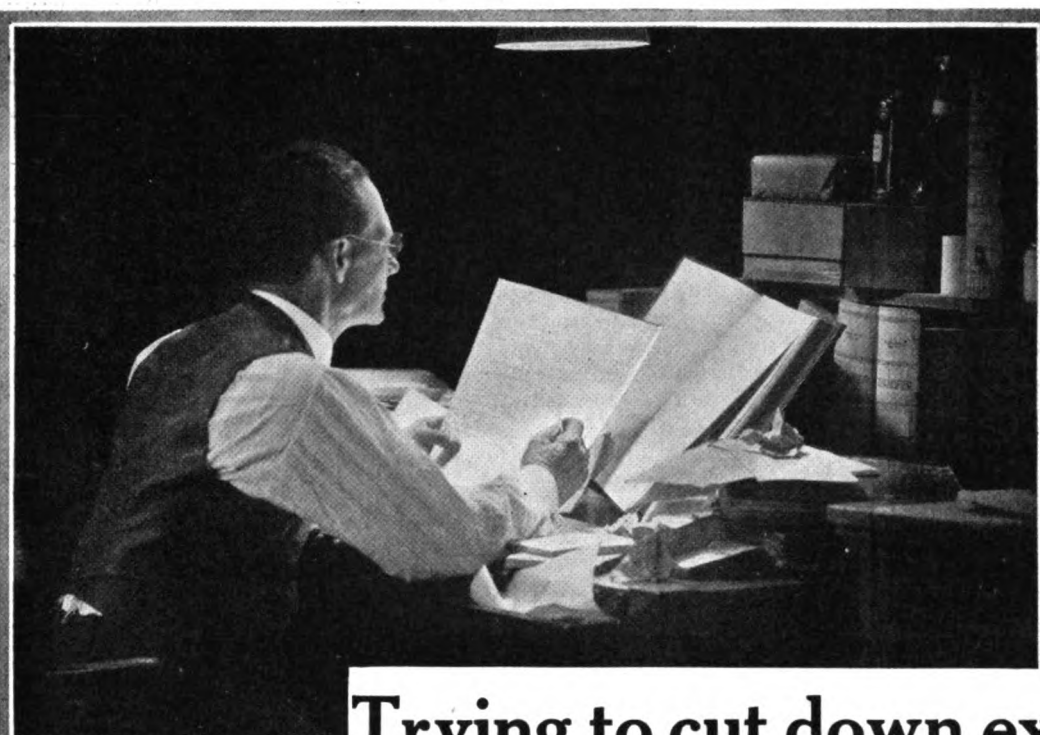
This valuable new tool is being offered at an attractive price by the manufacturer, who will gladly forward further information to those interested, upon request.



DuAl Gives Real Comfort.

any line, or in the exact direction of the shock pressure, and creates a smooth riding action.

The end shocks are eliminated with the DuAl by lifting the springs off the axle



Trying to cut down expenses

New business conditions have forced every merchant to face the problem of reducing expenses.

Thousands of merchants have solved the problem by using new model National Cash Registers.

These cash registers reduce costs of selling, delivery, and bookkeeping. They stop expensive leaks and losses. They also point the way to other economies by giving merchants, every day,

necessary business facts

National Cash Registers now priced as low as \$75 in U. S. A.

They pay for themselves out of part of what they save.

- ① Sales made by each clerk.
- ② How goods are moving in each department.
- ③ Amount of capital tied up in outstanding accounts.
- ④ Volume and profit on credit business compared with volume and profit on cash business.
- ⑤ Total of money paid out.

These facts show how, when, where, and how much to reduce expenses.

A National Cash Register is the only machine that issues a receipt, indicates, adds, prints, classifies, and distributes records *at the time of the sale*, all in one operation. No figure work. No delays. No mistakes. Just read the totals.

NATIONAL

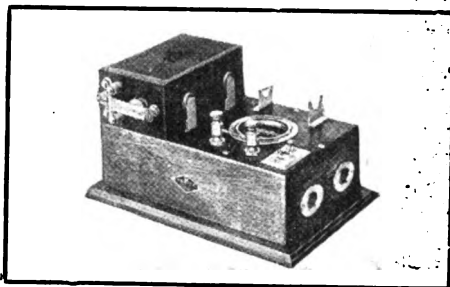
CASH REGISTER COMPANY-DAYTON-OHIO

Up-to-the-Minute Garage Equipment

"It Is a Scientifically Constructed Instrument for Testing."

It changes guess work to certainty, and saves money by eliminating waste of time. What is it? "The B-W Tester," says the B-W Electric Co.

The "B-W" is a new device, just being placed on the market, and was constructed for testing Ford coil units, single and double



Tests and Adjusts Coils in a Few Minutes.

contact lamps, and spark-plugs. With it, the manufacturer claims, a full set of coils can be tested and properly adjusted in a few minutes.

The case is of hardwood, dark walnut, satin wax finish on which is mounted an accurate low reading ammeter, coil guides with contact and spark gap. Equipment is provided for testing spark-plugs and double and single contact lamps, and the tester is fitted with a high grade indicating toggle switch. All fittings are of highly polished nickel.

A knowledge of electricity is not necessary to properly use the B-W tester. It is simple to use and easily understood. Full and complete instruction is furnished with each instrument.

The "B-W" comes in two types—Type D, for direct current, equipped with a direct current ammeter, with cord and clips for conveniently connecting to standard and six-volt battery or dry cells, and Type A, for alternating current, equipped with a transformer, alternating current ammeter and a cord with a standard plug for use in any alternating current lamp socket.

For further details and trade prices write at once to the B-W Electric Co., 7421 Manchester Ave., St. Louis, Mo.

New Turner Torches Offer High Degree of Efficiency.

The orifice of the blowtorch being a delicate part, it naturally follows that the life of the torch will be prolonged if the strain is taken off this part.

And that is one of the specific claims made for the new style torches now being marketed by The Turner Brass Works. With the new construction, it is claimed, the forcing or enlarging of the orifice when

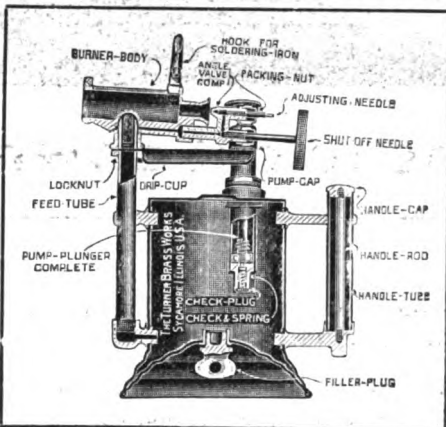
shutting off the torch is positively eliminated.

The shut-off and the needle valve are separate. The upper needle is used for a regulating or adjusting needle and the lower is used only for shutting off the torch.

The baffle in the burner tube generates the low grade gasolene or kerosene to a hot dry gas. As dry gas takes on more oxygen, more heat is thus generated on less fuel.

A flared tube is used at the inlet, which syphons the correct proportion of air regardless of the size of the flame.

These torches will burn either gasolene or kerosene without any change in adjust-



Turner Gasolene-Kerosene Torch.

ment. Because of the great heat produced, it was found necessary in the new construction to place the feed tube on the outside of the tank to prevent any possibility of heating the fuel in the tank to such a degree that it would create gas pressure and cause an explosion.

The Turner Brass Works, Sycamore, Ill., will gladly send circulars illustrating and describing the various types and sizes of their torches to those interested.

Time Is Money—Save Both With "Square Deal" Pump.

"It does everything but talk—prints that," has been said of the "Square Deal" pump.

The "Square Deal" is a visible, registering, automatic gasolene pump, using the vacuum system operated by a 1/2-horsepower motor.

The gasolene is measured in a one-gallon cylinder which is inside a ten-gallon glass cylinder, thus protecting the small glass cylinder from the expansion and contraction caused by heat and cold, as well as eliminating the ice that sometimes forms on glass cylinders in cold climates.

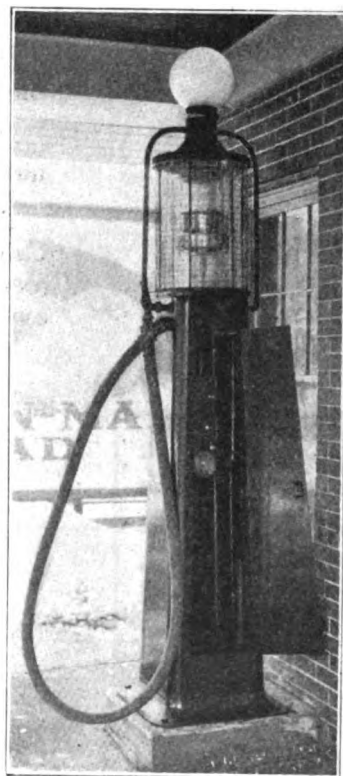
The gasolene is measured and pumped into the car at from ten to 15 gallons per minute, and the speed can be regulated as

desired. A registering device in the pedestal of the pump keeps a record of the daily and grand total sales, and prints and delivers a ticket for each sale which shows the name of the garage or filling station, date and number of gallons.

If the sale is charged, the purchaser signs the back of the ticket, thus eliminating all controversy as to charges. The gasolene starts to flow into the car from the time the first gallon is measured, thus avoiding a tedious wait for the customer.

There is no "sight unseen" or privacy about the operation of a "Square Deal" pump. If seeing is believing, you will see at once that the pump is well-named, as it gives a square deal not only to the buyer, seller and the oil company, but to the operator.

After the arrow or pointer is set to the desired number of gallons on the dial in front of the pump, a small lever starts the motor and, when the required number of gallons are delivered, the pump automatic-



"Does Everything but Talk."

ally stops. The ticket is printed and turned out, the sale recorded on the daily and grand total counters and the whole transaction is completed with unusual rapidity.

The "Square Deal" pump is handsome in appearance, being colonial in construction, thus making it an attractive addition to any filling station or garage.



Flexlumes Mark Show-Rooms of Quality

Flexlume Electric Signs have been so widely accepted by banks and other leading business houses that they have come to suggest quality to the public mind. That is exactly the suggestion you want your showroom sign to carry.

Flexlume Signs are day signs as well as night signs—raised, white letters on a dark background. They have greatest reading distance, lowest upkeep cost, most artistic designs.

Let us send you a sketch showing a Flexlume
to meet the particular needs of *your* business.

FLEXLUME SIGN COMPANY, 25 Kail St., BUFFALO, N. Y.

FLEXLUMES—Electric Signs Made Only by the Flexlume Sign Company



"Me for it"

I am the stuff for this job. The repairmen insist on having me when there is a battery terminal or any other parts on the car to be soldered. As one of them said the other day, "This Kester saves dollars' worth of time and a helluva lot of trouble." Being self-fluxing, I do away with half the work—and the hardest half at that.



CHICAGO SOLDER COMPANY
4210 Wrightwood Ave. Chicago, Ill.

Do you still fuss
with an acid
pot? Ditch it.
Send in the
coupon and
learn how.

CHICAGO SOLDER CO.,
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

Company

Address

City

State

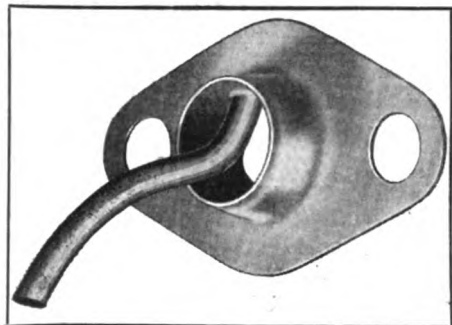
Our Supply House Is

Simple, practical, and mechanically correct, the "Square Deal" pump is worthy of the attention of the progressive garage-man and dealer.

Complete details may be obtained by writing to The Julian Pump Co., Jamestown, N. Y.

Re-Atomizer Saves Gasolene and Avoids Many Motor Troubles.

One of the most recent innovations in the accessory field is the Penberthy re-atomizer. The designers of the re-atomizer



Extreme Simplicity a Characteristic.

have tackled the gasolene-saving problem from a different angle.

They work on the theory that, if all of the gasolene can be properly vaporized and the vapor distributed evenly into the cylinders, not only will the gasolene mileage be greatly increased but a great variety of motor troubles, caused by liquid gasolene entering the cylinders and crankcase will be avoided. This includes spark-plug and carbon troubles, "loading," thinned-out oil, etc.

One of the chief advantages of the re-atomizer is its extreme simplicity. It consists of a brass ring or annulus, so designed that it fits snugly into the manifold between the carburetor and the cylinders and traps the liquid gasolene as it condenses on the side walls and at the bottom of the manifold. As the condensed gasolene collects, it runs down to the bottom of the re-atomizer where it is caught in a powerful air stream that pours through the tube, as shown in the illustration.

This air stream completely vaporizes the gasolene and carries the vapor on into the cylinders evenly.

The makers make great claims for its efficiency as a gasolene-saver. Their faith in the device is shown by the fact that it is being sold with an unqualified money-back guarantee that it will decrease gasolene consumption, in addition to accomplishing all the improvements in the motor mentioned above.

The re-atomizer is made to fit most of the better known cars including the Ford.

The re-atomizer and the unusual guarantee behind it are especially attractive due to the fact that they are made by the Penberthy Injector Co., of Detroit, Mich., an old substantial company which has been making steam injectors for 36 years.

Acid Handling is Dangerous! Why Not an Efficient Battery Pump?

Announcement is made to the automobile trade, jobbers, garagemen, battery repairmen, and battery service stations, by the Leader Battery Equipment Co., Inc., of the development of a universal battery acid pump. It is designed to fit 60 to 100 per cent of the carboys on the market, and the manufacturers claim that it will positively do everything which they profess it will do.

Further claims are: That this pump automatically justifies its air control; the flow of the pump may be stopped instantly; and it is easily adjusted to every carboy up to three feet in depth.

The outlet of the pump consists of hard rubber tubing, standing a specific gravity acid up to 1720. The size of the stopper that fits the neck of the carboy is $2\frac{1}{4}$ inches by 3 inches by $1\frac{1}{4}$ inches. The outlet pipe of the acid is $\frac{5}{8}$ -inch with a $\frac{3}{16}$ -inch wall, and this tubing is made of the Goodrich Defiance grade.

There has been a great demand for such a style of pump in the market, as we all know that acid is a very dangerous substance to handle.

The Leader Battery Equipment Co., Inc., of 324 Title Guaranty Bldg., St. Louis, Mo., will gladly send detailed illustrated bulletins to anyone interested.

Simple, Speedy, Economical—That's the Cady!

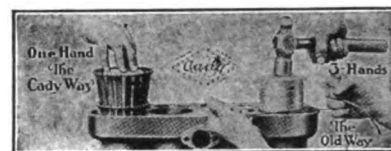
How often have you had to call an assistant from his work—rush work, maybe—to help you in fitting piston rings? Many times, probably. That is, you probably have unless you are one of the fortunate

possessors of a Cady piston ring compressor.

Undoubtedly this new tool will be welcomed with enthusiasm by garage and repair men, who have long wished for a good piston ring inserter.

The Cady is entirely automatic, no adjustments being necessary. It is made of the best of material, finished in white nickel.

The old way meant no small loss in breakage of piston rings as well as loss



Cady Compressor Is Entirely Automatic.

of time. The new way—the Cady way—prevents all breakage, and it instantly adjusts itself to all types and sizes of piston rings, from $2\frac{1}{4}$ to $4\frac{1}{2}$ inches in diameter, covering all sizes of standard motors. The illustration shows its simplicity.

With the Cady ring compressor all that is necessary is to draw the compressor over the lower end of the piston a short distance; then place the piston in the cylinder and with a little pressure on the top of the piston the spring at the bottom of the compressor automatically closes the rings as they enter the cylinder.

Rings can also be placed on pistons by slipping the ring over the spring end of the compressor, placing on the piston, and slowly drawing the compressor over the groove in the piston. The ring will then slide off the compressor very easily.

Write the Waglew Mfg. Co., Syracuse, N. Y., for further particulars concerning this time and patience-saving device.

A New Alignment Device for Ford and Fordson.

The Dearborn connecting-rod and piston alignment device No. C-3, for Ford and Fordson, is designed for the aligning, testing and straightening of Ford and Fordson connecting-rods and also for squaring pistons with crankshaft bearings.

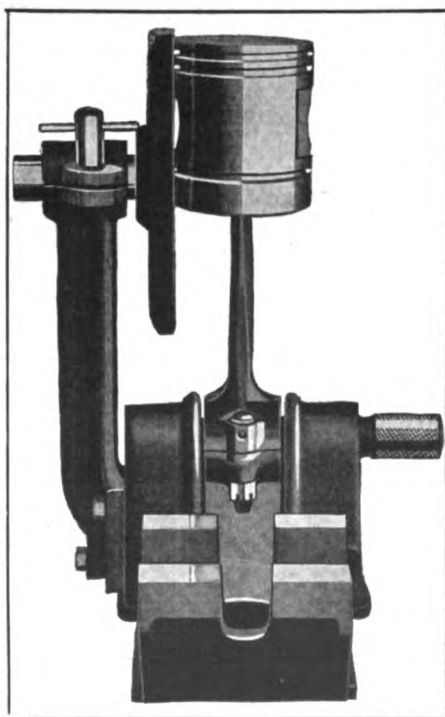
The manufacturer claims that it enables the operator to determine whether or not connecting-rods are bent or twisted and permits straightening or adjusting to be done without removing the rods from the mandrel.

Its weight is 60 pounds.

Further details may be obtained from the Dearborn Equipment & Hinckley-Meyers Co., general sales department, 1503 Tower Bldg., Chicago.

Paragraph.

THE JEWELL POLAR Co., 565-567 West Van Buren St., Chicago, announces the manufacture of a new battery steamer, suitable for garage use. An article descriptive of this new steamer will be published in our November issue.



Dearborn Alignment Device No. C-3.

A Bargain for Cash Make a Reasonable Offer

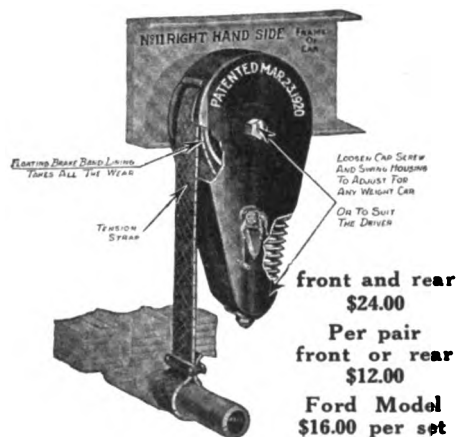
20 SMITH FORM-A-TRACTORS

complete with extra radiators for Ford. Attach to any Ford car in seven minutes and have a tractor that will plow, or do anything that any tractor will do. **THEY DO THE WORK.** Originally sold at \$255.00 per tractor. We are closing out this line and will make a price on the 20 tractors, or in lots of not less than five. Good chance for hustling salesman in farming community.

Wire or write your offer, giving references

HOOD-DENT COMPANY
WESTON, W. VA.

Every Road a Boulevard *when a car is equipped with* "BULL DOG" BOUNCE ABSORBERS



FOR ALL CARS

They can easily be adjusted to suit cars of any weight, springs of any rigidity, or the preference of any driver. **NO OTHER BOUNCE-ABSORBING DEVICE HAS THIS FEATURE.** Easily attached; needs no oiling; has no metal parts that will wear or break.

JOBBER! DEALER! Write for liberal discounts.

CHANNON-HUGHSON COMPANY
225-231 West Erie Street CHICAGO, U. S. A.

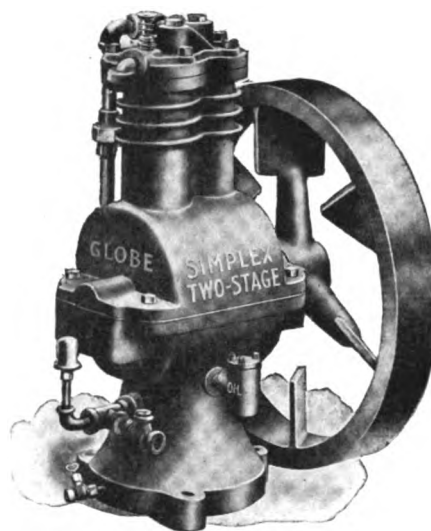
There He Goes--

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled—

Well, you don't *have* to let him go

You know perfectly well that a dependable free air supply is your best advertisement. The only way to keep your old customers and make new ones is to have a compressor which is on the job **ALL THE TIME.**

Here it is



GLOBE SIMPLEX TWO-STAGE

A New TYPE Compressor just put on the market after four years of observation in actual service. The most practical and dependable compressor you can buy, at a price which will surprise you.

No need to install a cheap, single-stage outfit now—You can have the **BEST Two-Stage** at the same price.

DON'T WAIT — PRICES WILL NEVER BE LOWER—BUY NOW and **hold your trade through the winter months** instead of complaining of poor business.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.



Use COUPON BOOKS

COUPON BOOK GOOD FOR \$10.00 IN EXCHANGE FOR STERLING QUALITY GASOLINE

AT ANY AUTO FILLING STATION OF THE STERLING REFINING COMPANY, OKLAHOMA CITY, OKLA.

Issued to _____ Countersigned by _____

No. 3002A

1 CENT

5 CENT

10 CENT

25 CENT

50 CENT

They Encourage Sales--

Place Your Business on a Cash Basis

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

In place of a multitude of petty transactions involving endless bookkeeping is substituted a simple, self-regulating system, so easy to grasp that the most ignorant patron cannot complain nor the most careless employe make mistakes. A coupon book has no value until issued, countersigned and dated. If lost or stolen it has no value.

The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

Southern Coupon Co.
Box 1472 Birmingham, Ala.

Death of George S. Loudon of the Marvel Machinery Co.

In the passing of George S. Loudon, whose death occurred on September 8, the automotive industry has lost one of its most capable men and best friends. Mr. Loudon's ancestors were the sort of people who did things on their own initiative and as they, in their respective lines of business endeavor, succeeded gratifyingly, it was but natural that George S. Loudon should do likewise.

His activities were varied, but while associated with the Marvel Machinery Co. as sales manager and later as general manager, he helped to create an enviable repu-

tation for himself and for the company with which he was identified.

He believed implicitly in giving his customers the utmost satisfaction and that this policy repaid him was attested by the many successful sales which he made for Marvel reborring machines and pistons.

Though he has gone to the bourne from whence no traveler returns, his memory will be a lasting monument that the wisest policy is to make every customer satisfied.

Wainwright Engineering Corp. Announces Changes in Organization.

The Wainwright Engineering Corp., Connersville, Ind., has recently announced

several changes in its organization. Walter Duda, formerly sales manager of the Faeth Co., Kansas City, Mo., has been appointed sales manager. Joseph F. O'Brien, who for six years was assistant buyer of The Gibson Co., Indianapolis, Ind., becomes chief of the order department.

The company's Pacific Coast territory has been assigned to John D. Carmody as district manager, with headquarters at San Francisco. Mr. Carmody was district manager for the Champion Spark Plug Co. for eight years.

W. E. Dollinger, Dan P. Shaw and C. L. Boman have been added to the sales force, with headquarters in Kansas City, Chicago, and Minneapolis, respectively, under the direction of Jack Hundt, district manager.

William Karg and Jack Uhl are to be associated with the sales organization in the East, under the direction of H. E. Witherspoon, district manager, New York City.

New General Machine Works Opened by Boissonnault Co.

The G. Boissonnault Co., Inc., with general offices at 26 Cortland St., New York City, and factory at Whitestone, Long Island, N. Y., has opened a general machine department.

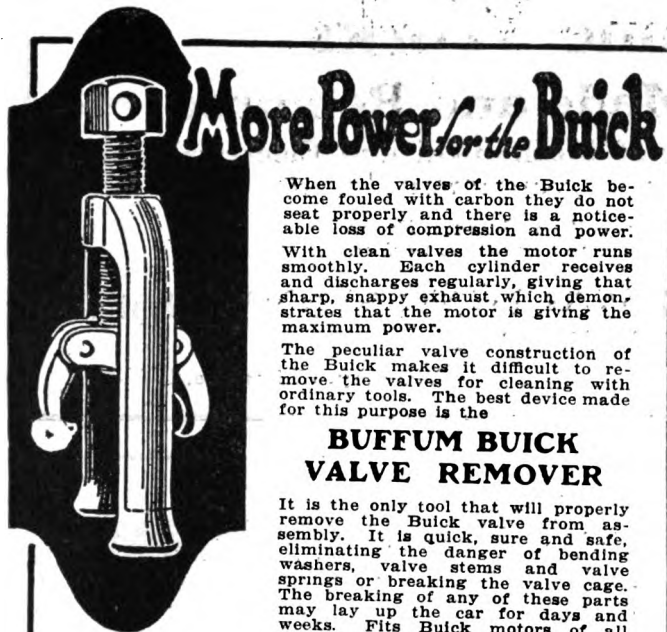
Excellent machine shop facilities for assisting garages, repairshops and service stations are provided, the plant having been equipped for all kinds of mechanical, electrical and experimental work and being operated by expert engineers and machinists. The company is also prepared to design automotive parts and other machine and electrical parts.

One department of the general machine works will be used for the designing of tools, fixtures, dies, jigs and automobile parts and for their making and repairing. In addition, there will be stamping and general manufacturing.

With these facilities, the Boissonnault company is in excellent position to give prompt and reliable service to the automotive trade.

Gaston Boissonnault, the president of the company, is 45 years of age, a native of New York state and of French parentage. At an early age he developed the instincts of observation and detection. He is the originator of the Detectagraph modern detective devices, and has been actively engaged in secret work of various kinds for many years.

With unseen devices, Mr. Boissonnault secured corroborative evidence which saved a railroad corporation from being blackmailed out of \$75,000, and at another time saved an insurance company from paying out \$150,000 on a fraudulent insurance policy. In numerous other cases he has succeeded in exposing trickery and fraud. He is also the inventor of a number of devices to help the deaf, all of which have been highly commended.



More Power for the Buick

When the valves of the Buick become fouled with carbon they do not seat properly and there is a noticeable loss of compression and power. With clean valves the motor runs smoothly. Each cylinder receives and discharges regularly, giving that sharp, snappy exhaust which demonstrates that the motor is giving the maximum power.

The peculiar valve construction of the Buick makes it difficult to remove the valves for cleaning with ordinary tools. The best device made for this purpose is the

BUFFUM BUICK VALVE REMOVER

It is the only tool that will properly remove the Buick valve from assembly. It is quick, sure and safe, eliminating the danger of bending washers, valve stems and valve springs or breaking the valve cage. The breaking of any of these parts may lay up the car for days and weeks. Fits Buick motors of all sizes since 1912. Is strongly built of the best materials, yet is light and compact.

Every garage and repair shop should have one as regular equipment. Dealers find them ready sellers to Buick owners, who should carry them, especially in touring, as they may get broke down out in the country where a garage might ruin valve cage.

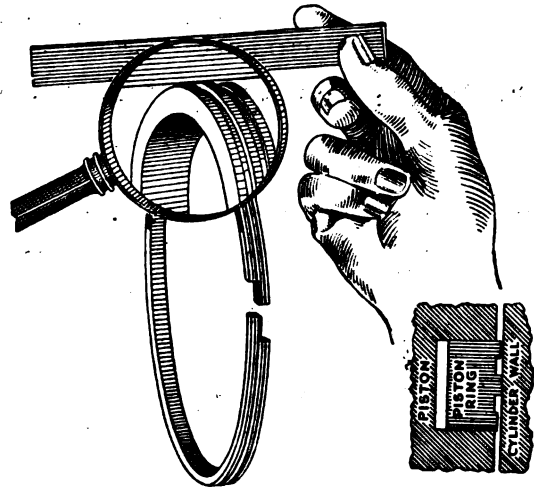
Retail Price \$2.00. Fully Guaranteed.
Write for Trade Prices.

BUFFUM TOOL CO.

Factory and General Offices

4th and N. Carolina St. LOUISIANA, MO., U. S. A.

Your customers will like INSTANSEAT Piston Rings



Their construction enables them to seat completely in a run of 25 miles or less—a feature that appeals strongly to the car owner who has had to drive several hundred miles before he got proper results from a new piston ring installation.

INSTANSEAT Rings have three raised surfaces, each one and one-half thousandths of an inch above the other. This causes them to wear in rapidly, giving a large and perfect bearing surface and this insures good results even after long usage.

DEALERS—The INSTANSEAT is a winner. Write today

KRASBERG PISTON RING CO.

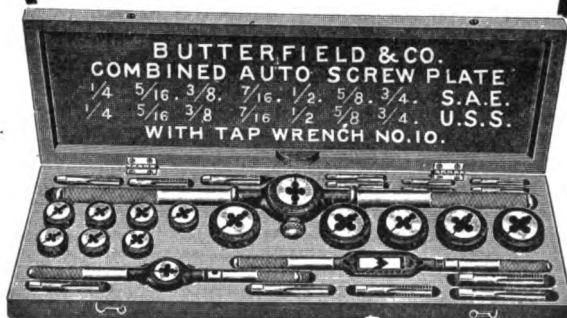
536 Lake Shore Drive

CHICAGO

BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because they were designed expressly for garages and repair shops.



BUTTERFIELD & CO.
COMBINED AUTO SCREW PLATE
1/4 5/16 3/8 7/16 1/2 5/8 3/4 S.A.E.
1/4 5/16 3/8 7/16 1/2 5/8 3/4 U.S.S.
WITH TAP WRENCH NO. 10.

Set shown in illustration enjoys a well deserved popularity in the automotive field. Contains in one set—both U. S. Standard and S. A. E. Standard taps and dies—thus saving the expense of buying a separate outfit of each. Every tool guaranteed to cut rapidly and to produce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

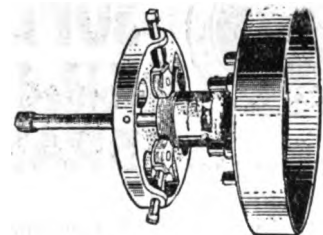
Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.

The F. & W. Universal Wheel and Gear Puller is the only tool made which can be fastened to the hub threads of any automobile.



Strength and wide range of adjustment make this tool superior for gear pulling and arbor press work. Malleable plate for press shown at right of complete tool below. Note material used; heat treated nickel steel arms; hexagon blocks and large power screw are hardened malleable castings.

Each of the six sides of hexagon blocks shown above has different size thread for engaging any hub thread. Adjustable to hubs of various diameters. Any mechanic knows the advantage of pulling direct on hub instead of the old awkward method of hitching to spokes.

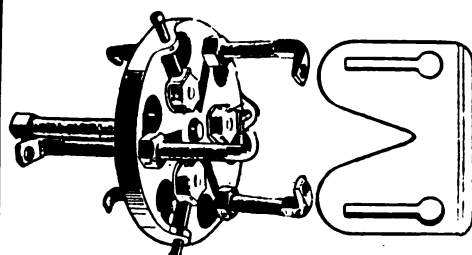
List price complete, \$32.00

Write for discounts.

LEWIS & MILLIGAN, INC.

2108 Boulevard Place, Indianapolis, Ind.

Hornor, Greene & Wilde, Ltd.,
1110 Michigan Ave., Chicago, Illinois



General Machine Works

Auto Parts Designed, Made and Repaired

Also Specialize on the Designing and Making of Mechanical and Electrical Tools, Fixtures, Dies, Jigs and Stampings. Experimental work.

Splendid facilities for giving "prompt service" to Garages, Repair Shops and Service Stations. Correspondence and Inquiries Invited.

GENERAL MANUFACTURING MACHINE SHOP Dept of)

G. BOISSONNAULT COMPANY, Inc.

General Offices: 26 Cortland St., New York

Factory: Whitestone, L. I., N. Y.



Don't Be a Mutt

You don't need to pay a big, fancy price for a good spark plug any longer. Get a

Little Jeff

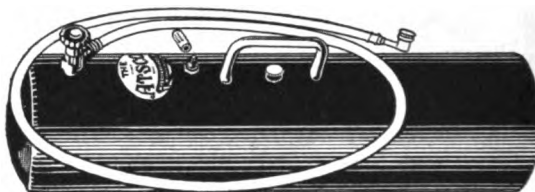
They sell at retail for **Fifty-five Cents**

Besides giving you the best plug for a lot less money, we send free with every Little Jeff Plug one Little Jeff Plug Cleaner. This simple and ingenious new invention enables you to clean a set of plugs in two minutes. We will send one Little Jeff Plug Cleaner FREE to anyone upon receipt of a five cent stamp to cover cost of packing and mailing.

Write us today for booklet and prices

GENERAL ACCESSORIES CORPORATION, Chicago

DEALERS—We have an attractive proposition for you. Write us for details and trade prices.



You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.



A line that will pay you to sell

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—Write for data and prices on brake lining, clutch facings, Ford Transmission lining, running board mats and packings.

Manufactured by

MIKESELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois

Plant and Works, Wabash, Indiana

J. NEWTON BODDY

Auditor, Accountant, Systematizer
Specialist in Automotive Accounting

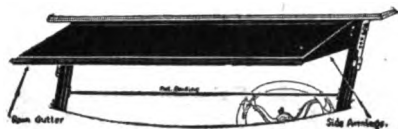
Audits, Investigations, Surveys, Systems
Income Tax Reports

Monthly Balance Sheets and
Operating Statements Prepared.
Unit and Process Costs Established.

322 South Fourth Street
Phone Atlantic 1810
Minneapolis, Minn.

Cash Journals, Sales Journals, Ledger Leaves,
Purchase Journals, Car Records, Truck Records,
Storage Tags, Shop Cards, Duplicate Statements,
Special Forms, Purchase Orders, Invoices,
Sales Books, Blank Books, Loose Leaf Binders.

We Specialize in Systems for Automotive
Dealers

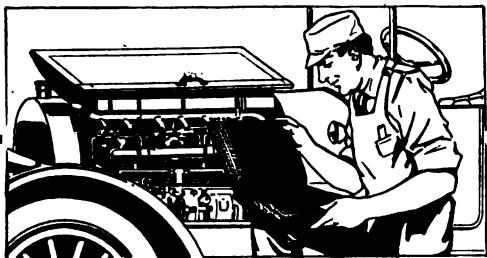


What Car Owners Like About New Era Visors

THERE'S a world of pride and satisfaction in selling quality merchandise that lends greater utility of service — endurance — and absolute safety to the car owner. These and many exclusive features make New Era Visors the popular leaders in their field. Adjustable to height of driver's eyes—gutter that catches the rain and carries it to either side where awning ends throw it entirely away from car. All metal with black enamel outside and dull green underneath. Prices \$10 for Steel—\$15 for Aluminum. Write today for catalog.

New Era Spring & Specialty Co.
Cottage Grove Ave. Grand Rapids, Mich.

NEW ERA
DeLuxe VISOR
all metal



Make Your Shop "Electrical Repair Headquarters"

by handling this class of work in the time-saving, cost-cutting, error-proof way—like the man in the picture above. Before he touches a tool he sees a clear, accurate blue print of the car's whole electric system and knows how to tackle the job.

The AUTOMOTIVE WIRING MANUAL

enables you to quickly and accurately repair the wiring or other electric equipment of all cars, including orphans and obsolete models. You can give your customers the kind of service for which they will not only pay handsomely, but also send their friends to you.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

The profits on a very few jobs pay for this book. Price, delivered, only \$15.00. Send us your order and check today.

AUTOMOTIVE PUBLISHING CO.

448 S. Dearborn St., Chicago, Ill.
41 E. 29th St., New York
Suite 924, No. 18 Tremont St., BOSTON, MASS.
N. F. ANDRUSS, 404 Golden Gate Ave., SAN FRANCISCO, CAL.
London, England. Motor Technique Bureau, 149 Strand, W. C. 2

Prepare now for your Winter Storage Business

by equipping yourself to protect the cars in your storage space from dust, dirt, rust and cold with

Kennedy Auto Covers

which also protect tires by excluding the light from the rubber.

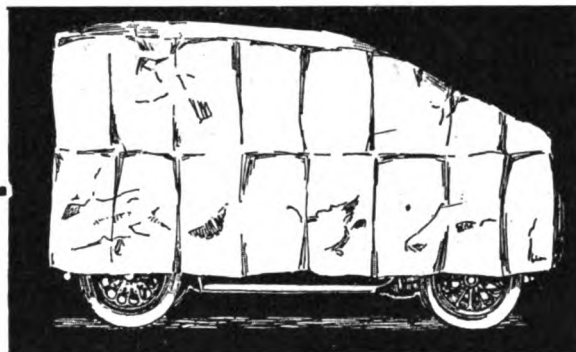
Car owners readily appreciate the value of Kennedy Covers and willingly pay the moderate price asked. You make a good profit on each one. They are also good sellers to car owners who keep their cars in their own garages.

Fill up your storage space this winter and get the repair and equipment business that goes with it. Write today for prices.

THE KENNEDY CAR LINER AND BAG CO.

Shelbyville, Indiana

Canadian Factory at Woodstock, Ont.



Dealers - Jobbers - Distributors

F. A. A. CAST IRON & ALUMINUM MENDS

Are in Demand Everywhere

Use F. A. A. MENDS in repairing scored Cylinders, Cracked Water Jackets and Aluminum Crank Cases. They give a solid and permanent result, that is associated with scientific welding.

When you are troubled with a Scored Cylinder, Cracked Water Jacket or Aluminum Crank Case, have it repaired with incomparable F. A. A. MENDS.

It achieves more and costs less than any other.

Give these MENDS a trial or ship your CYLINDERS or CRANK CASES direct to us—they will be returned the same day received.

NO REGRINDING, NO NEW PISTONS, NO WARPING or CRACKING.

Let us send full particulars—Write today.

F. A. ALBERTUS & CO.

206 Ninth St.

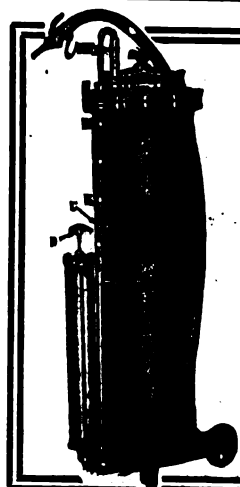
Milwaukee, Wis.

DOUBLE LATTICE TRUSS

Constructed right on the ground where the building is to be erected, guaranteed to carry any weight of snow load.

WRITE FOR FULL PARTICULARS.

Leo McDaniel Contracting and Engineering Co.
218-220-222 NINTH ST.
CAIRO, ILLINOIS



The Boe Double Action Grease Pump

Operates by forced air pressure or by hand or by a combination of both.

Accurate as a scale. Adjustable "visible" measuring. Indicator "B" travels nearly 8 inches for 1 lb. or pt. Can be set to dispense any exact quantity desired.

Will handle 30 pounds of silent gear grease in one minute.

Ask about our 15 other pump outfits.
Biggest line of its kind.

BOE MANUFACTURING CO.
MINNEAPOLIS, MINN.

For Those Who Know and Want the Best

REYNOLDS

RED DIAMOND CUSHIONS

FOR FORD CARS

A Perfect Product for Particular People

Made by the largest exclusive cushion spring factory in America and the most comfortable and durable cushions ever built for Ford Cars by anybody.

Sold thru regular channels only.

Manufacturers
THE REYNOLDS SPRING CO.
JACKSON, MICHIGAN

Sales Dept.
THE ZINKE CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS



Pat. 2-18-'19.

Spark Plug Troubles Are Rare Occurrences

on the car equipped with

UNIVERSAL SPARK PLUG INTENSIFIERS

There is a big demand for a device that insures satisfactory operation from spark plugs which are worn out or on which the insulation is broken; or a plug fouled with grease or carbon.

These INTENSIFIERS will make such plugs fire perfectly. They indicate instantly whether a cylinder is missing and whether the ignition system is in perfect order. They give the spark more energy—producing more power and a smooth running motor. They eliminate carbon, waste of gas, cleansing the plugs and greasing which cylinder is missing.

EVERY ONE OF YOUR CUSTOMERS WILL WANT THEM

JOBBER and DEALERS—Your profit is liberal

Write today for our attractive proposition

UNIVERSAL MFG. & SALES CO.

550 W. Harrison Street

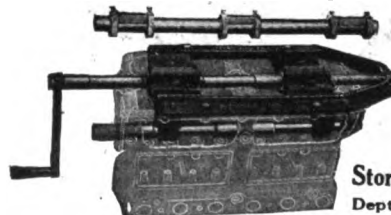
CHICAGO, ILL.

STORM

MOTOR REPAIR EQUIPMENT

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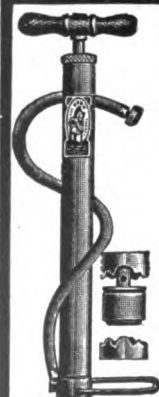
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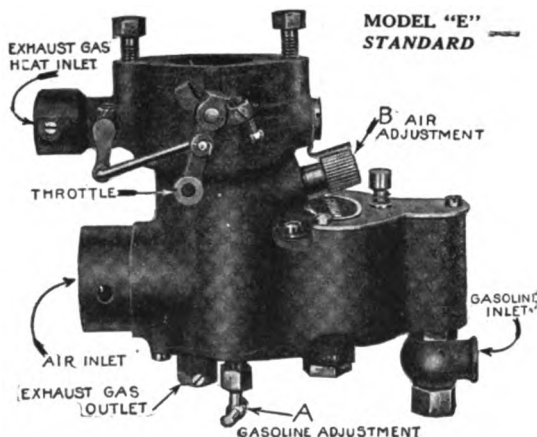
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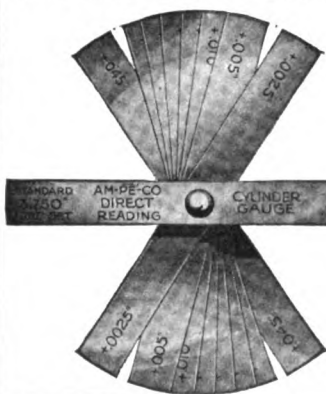
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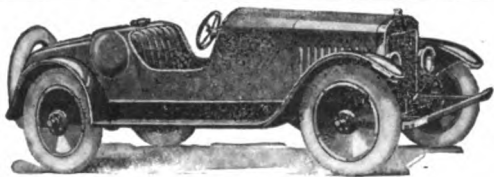
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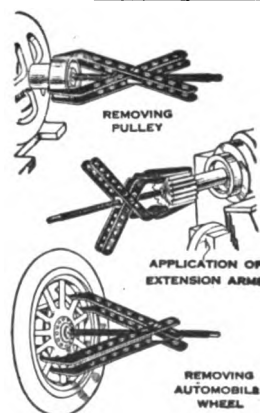


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Index to Advertisements

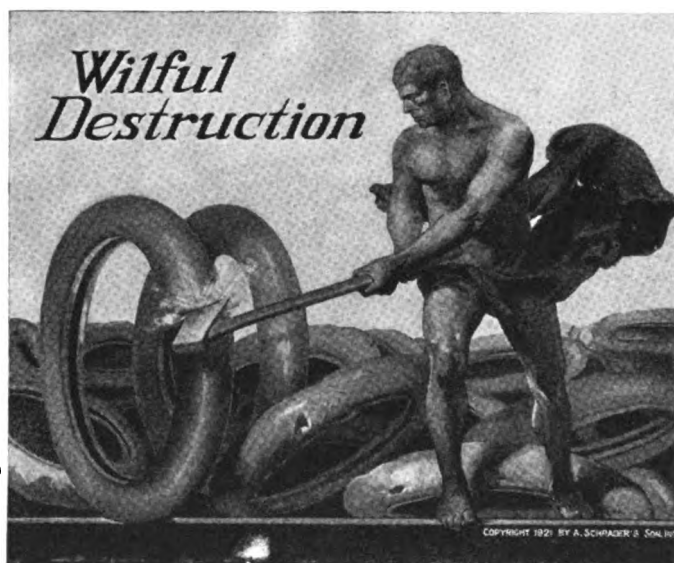
A		J	
Adamson Mfg. Co.	—	Jaffe Radiator Co.	39
Air-Tight Steel Tank Co.	54	Jenkins Vulcan Springs Co.	—
Albertus & Co., F. A.	55	Jewell Polar Co.	5
All-Spark Ignition Co.	—	K	
American Bolt & Screw Case Co.	—	Kennedy Car Liner & Bag Co.	55
Am-pe-co Sales Co.	59	Krasberg Piston Ring Co.	53
Atlas Auto Supply Co.	—	L	
Auto Specialties Mfg. Co.	55	Laminated Shim Co.	56
Automotive Publ. Co.	55	Leich Electric Co.	4
B		Lewis & Milligan	53
Bailey Co., Geo. D.	—	Loudon, Inc.	—
Benson Co., Alex. R.	59	M	
Boddy, J. Newton	54	McDaniel Contracting and Engineering Co., Leo	56
Boe Mfg. Co.	54	Magnet Light Co., The	—
Boissonault Co., Inc., G.	54	Marvel Carburetor Co.	54
Bowes Co., Robt. M.	57	Marvel Machinery Co.	57
Brewer Specialty Corp.	—	Metals Repair & Supply Co.	61
Brunner Mfg. Co.	62	Metal Stamping Co.	41
Buffum Tool Co.	53	Mikesell Bros. Co.	54
Burd High Compression Ring Co.	59	N	
Burgess-Norton Mfg. Co.	—	National Cash Register Co.	47
Butler Mfg. Co.	58	National Refining Co.	43
Butterfield & Co.	53	New Era Spring & Specialty Co.	55
C		P	
Catelain, Andre G.	58	Paro, H. G., Co.	57
Champion Pneumatic Machinery Co.	6	Premier Electric Co.	59
Channon-Hughson Co.	51	R	
Chicago Solder Co.	49	Reynolds Spring Co.	56
Clark Co., W. L.	—	Romort Mfg. Co.	3
Commercial Mfg. Co.	—	Rose Mfg. Co., Frank	56
Curtis Pneumatic Machinery Co.	37	R. T. Mfg. & Sales Co.	59
D		Rust Products Co.	—
Dearborn Equipment & Hinchley-Meyers Co.	—	S	
De Mund Sales & Service Co.	7	St. Paul Welding & Mfg. Co.	—
Dickerson, C. A.	57	Sampson Electric Co.	59
Drake & Co., Frederick J.	—	Sawyer-Weber Tool Mfg. Co.	—
Dunton Co., The M. W.	—	Schrader's Son, Inc., A.	61
Dyer Co., The	57	Shaler Co., C. A.	Front Cover
E		Southern Coupon Co.	52
Eclipse Valve Grinder Co.	—	Standard Accessories Corp.	59
Ever-Tyte Piston Ring Co.	—	States Chemical Co.	56
.....Inside Back Cover	—	Storm Mfg. Co.	56
F		Sunderland Machinery & Supply Co.	—
Farmers' National Life Insurance Co.	58	T	
Federal Electric Co.	45	Taylor, H. D.	Back Cover
Flexlume Sign Co.	49	Trindl Co., The	58
Foster Bros. Mfg. Co.	58	Tungsten Mfg. Co.	—
G		Turner Mfg. Co.	Inside Front Cover
Ganschow Co., William	—	U	
Garden City Spring Works	61	U. S. Air Compressor Co.	—
General Accessories Corp.	54	Universal Mfg. & Sales Co.	56
Globe Mfg. Co.	51	V	
Greb Co.	—	Van Trump-Esclbey Co.	—
Green Engineering Co.	58	W	
Greenfield Tap & Die Corp.	—	Wagner Specialty Co.	58
Greer College of Motoring	58	Warsawsky & Co.	58
H		Washburn Burner Corp.	—
Hauck Mfg. Co.	—	Webber Co., P. H.	6
Hicken Sod-Tor-Lite Co., B. E.	61	W. H. S. Mfg. Co.	—
Hood-Dent Co.	51	Worcester Abrasive Co.	—
I		Z	
Indiana Parts Co.	—	Zinke Co.	3 and 56

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Have them inspect your compressor outfit and show you how to get the greatest efficiency at the lowest cost. Ask them about new ways of using compressed air around the garage.

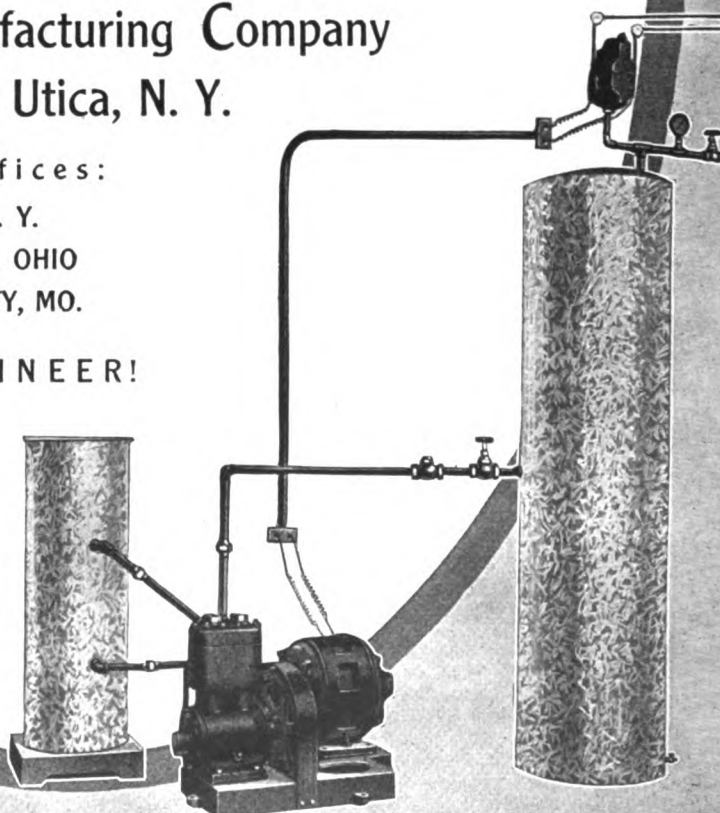
Your compressor can do more than inflate tires; it can show a substantial profit and be tremendously useful—ask your Brunner Engineer about it. He can save money for you and speed up your work.

Brunner Manufacturing Company
Works: Utica, N. Y.

Sales Offices:

UTICA, N. Y.
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ASK AN ENGINEER!



Nearly three years on duty and still in good condition



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INCORPORATED
Machinists and Founders

REPAIRING ANY AND ALL KINDS OF MACHINERY

ASHEVILLE, N. C.

April 11, 1921,

Ever-Tyte Piston Ring Division,
Walter A. Zelnicker Supply Co.,
St. Louis, Mo.

Gentlemen:--

The Zelnicker Ever-Tytes we in-
stalled in our Studebaker car in June
1918 have never been renewed and are
still in good condition.

Very truly yours,

CAROLINA MACHINERY COMPANY.

By *W.A.Z.*

WFP:FML



⁷ZELNICKER *Ever-Tyte* The Piston Ring for All Engines

is without a peer for long and sat-
isfactory service. It pays to install
the EVER-TYTE. Your customer
will not be back very soon for
more rings but he will come to
you for other equipment.

EVER-TYTE PISTON RING DIVISION
WALTER A. ZELNICKER SUPPLY CO.
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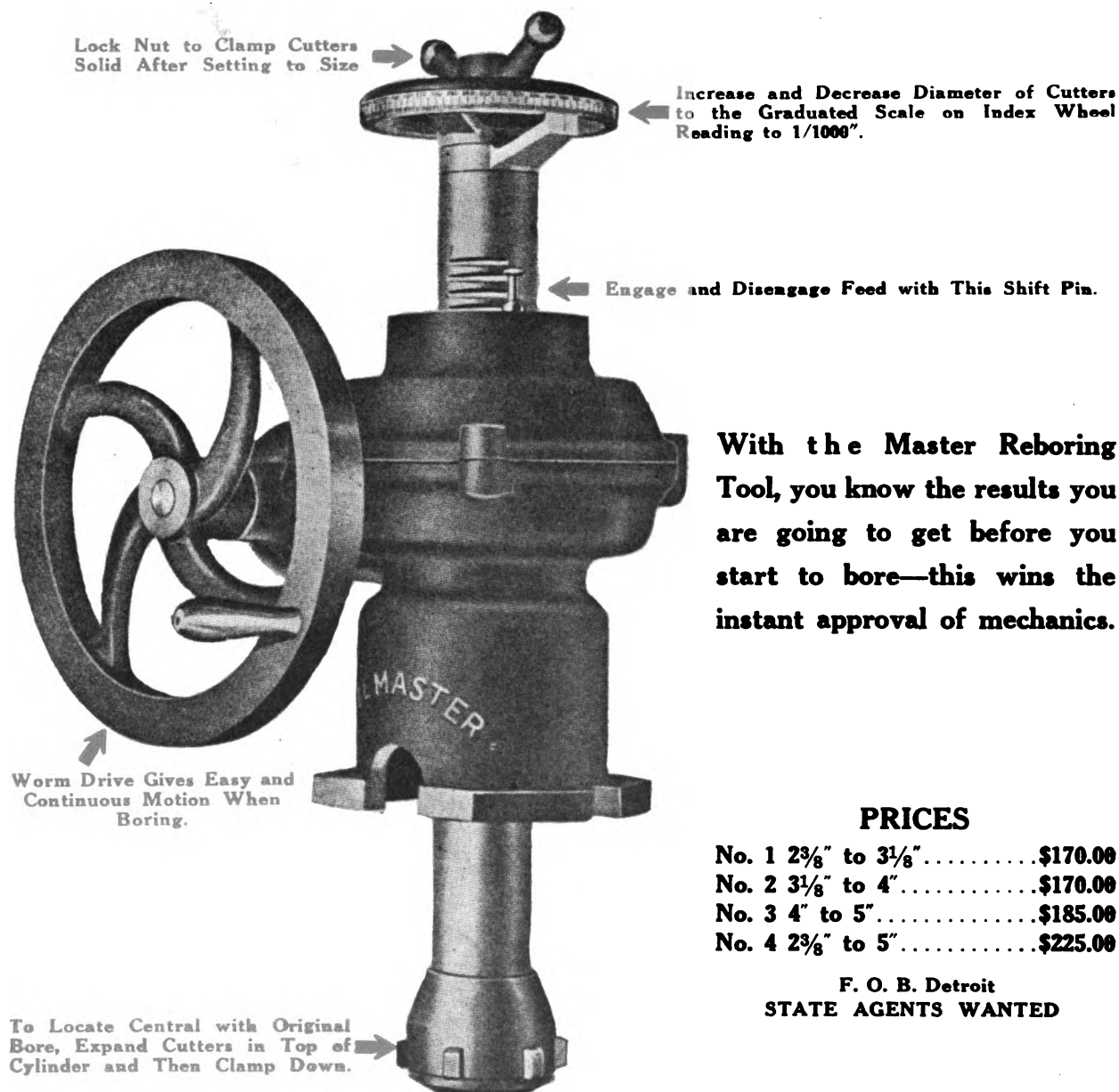


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If you have received none, send
for one, stating kind of unit in
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EARN \$60 PER DAY WITH THE MASTER

This wonderful machine will indicate its alignment with original bore, and insure a perfectly round, smooth, straight cylinder at one pass through. The graduated wheel at top enables you to set cutters to any size desired instantly, and shows at all times the size you are boring. The efficiency of the Master is guaranteed.



With the Master Reboring Tool, you know the results you are going to get before you start to bore—this wins the instant approval of mechanics.

PRICES

No. 1 $2\frac{3}{8}$ " to $3\frac{1}{8}$ "	\$170.00
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STATE AGENTS WANTED

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WORLD**

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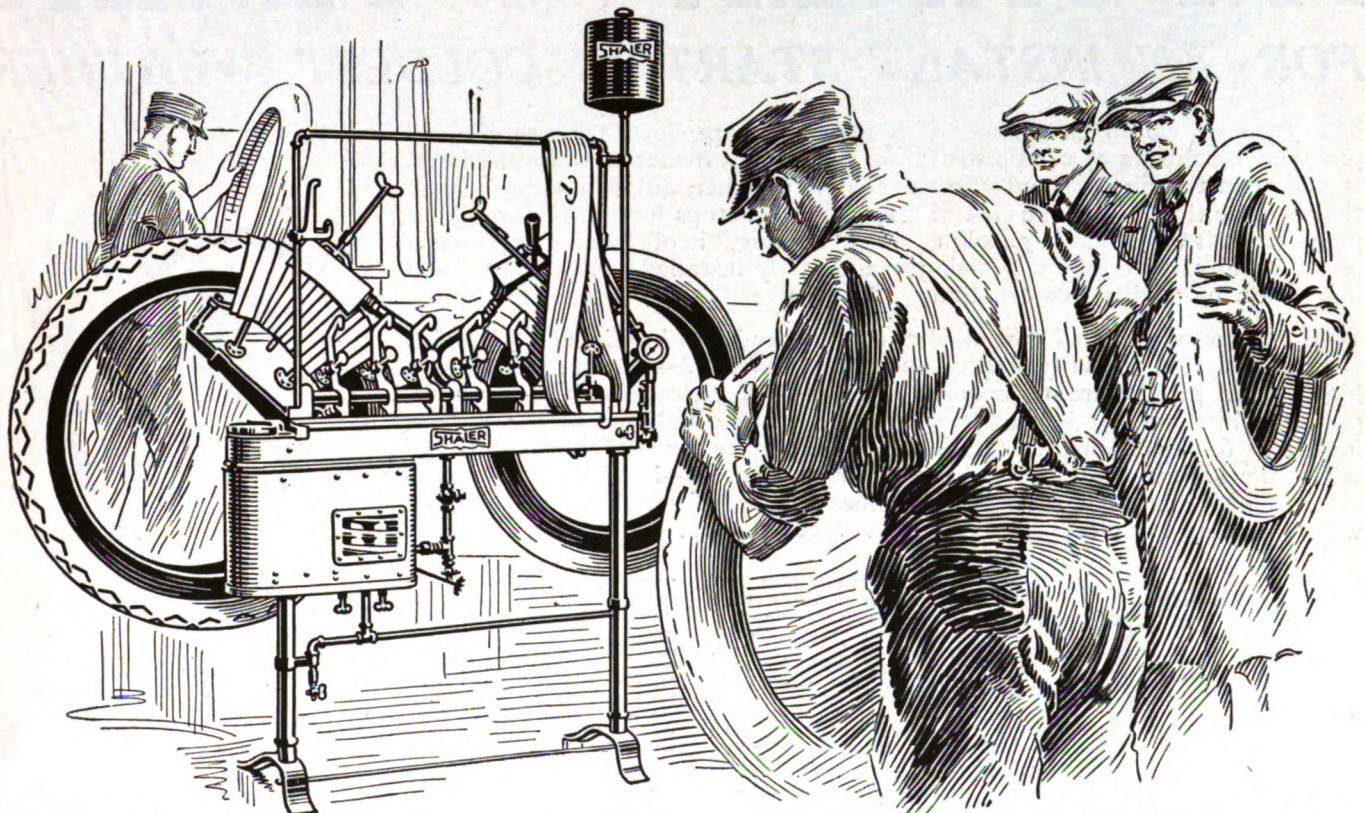
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American Garage & Auto Dealer

Published Monthly
116 So. Michigan Ave.
CHICAGO, ILL.

NOVEMBER, 1921

Vol. 17.—No. 11.
10 Cents the Copy.
\$1.00 Per Year.



Make Money Repairing Tires!

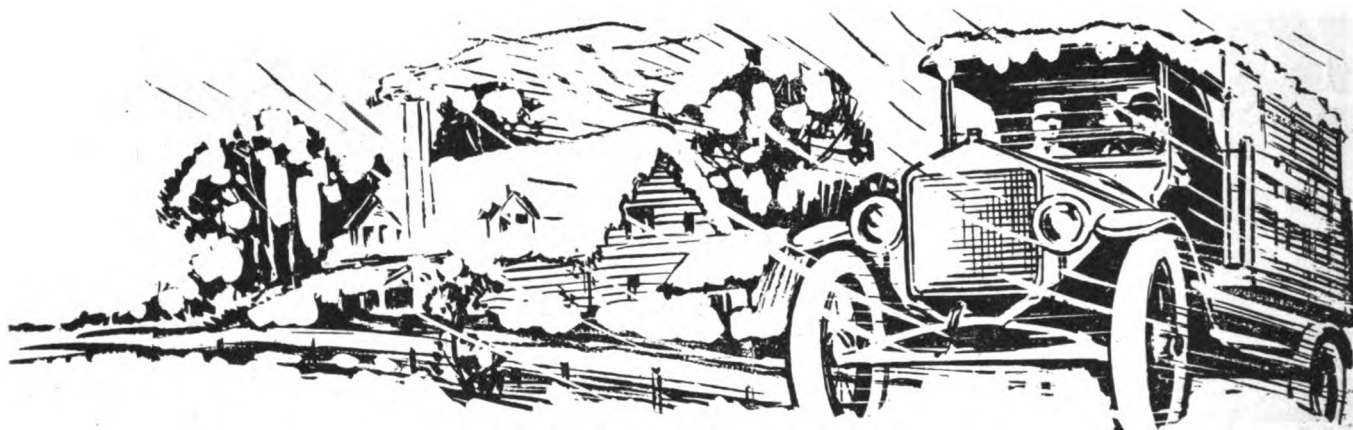
THE SHALER Shop Vulcanizer is so simple that a boy can operate it. You don't need experienced help, because it has Automatic Heat Control, and cannot overcure or undercure the rubber. You don't need to watch or regulate it. The SHALER uses the "Wrapped-Tread" Method—which is used by tire manufacturers—and turns out better jobs in less time than any other method. The complete SHALER Vulcanizing Plant—equipped with gas or gasoline burners for steam heat—or for electricity—including all necessary tools and complete instructions, costs less than \$100.

Write for Free Book — "How to Open a Tire Repair Shop"

which gives many helpful suggestions and simple instructions for making tire repairs. Don't fail to write for this book today. It will show you how to make more money and establish a profitable tire repair business. Do you know of any other business, which pays so well, that can be started for less than \$100?

We manufacture a complete line of SHALER Vulcanizers for every requirement of Garages, Repair Shops and Service Stations. They are used by the U. S. Government—and sold by reliable Jobbers all over the world. Write for our catalog which describes the complete SHALER Line, of steam, electric and dry fuel vulcanizers.

C. A. SHALER CO., 360 Fourth St., Waupun, Wis., U. S. A.

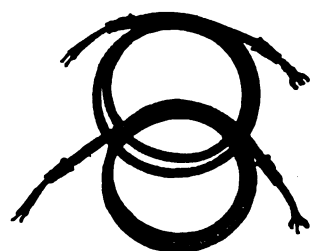
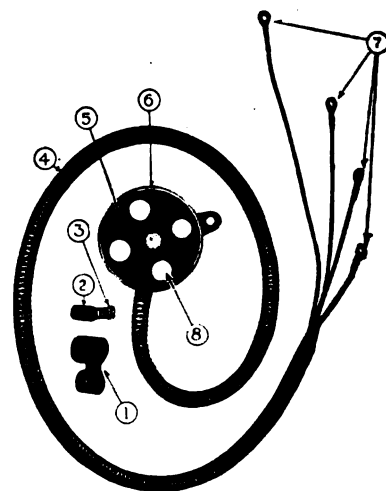


A TURNER (TWO IN ONE) TIMER

FOR AN INSTANT START IN COLDEST WEATHER

The Turner Two In One Timer is a guaranteed product, time tested and proven, with the stamp of approval from every Ford owner who has used one. It will start the Ford instantly in the coldest weather, an advantage in itself that is more than worth the cost of the device. It stops fouling the two front plugs in most cases, saves gasoline, stops "kicking," is oil, grease and water-proof, requires no oiling and is simply and easily installed. Note the following points of quality construction:

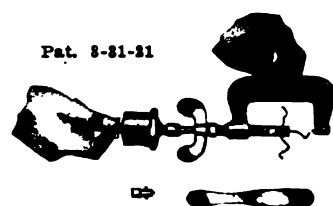
1—Brush container is of cast steel and brass, and will last indefinitely. 2—Contact brush of specially treated phosphor bronze. 3—Contact spring is of high grade piano wire telescoping type. 4—Flexible metal conduit cord packed, which entirely houses all wires. 5—Genuine Bakelite insulated Timing Disc. 6—Timer shell of aluminum. 7—Note the four different lengths of wires, the only wires that you have to connect up. 8—Hardened brass contacts of best quality is used. A machined product throughout. Timer and wire assembly complete.....\$4.50



TURNER LIGHTING WIRE ASSEMBLY—A boon to every Ford owner. Beautifies the car and protects it from the greatest source of automobile fire loss. All enclosed by flexible metal-conduit. Water, grease and oil-proof. Eliminates short circuiting and saves battery. No bare wires to cause expensive road repairs from magneto shortage. The Turner Wiring Assembly for Fords can be installed by anyone in ten minutes. For cars with starter, \$2. For cars without starter.....\$1.50

TURNER SPRING LEAF SPREADER AND LUBRICATOR — Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. The grease goes just where it is needed and nowhere else. A product that meets up in every way with the high standard of Turner quality. Price.....\$2.50

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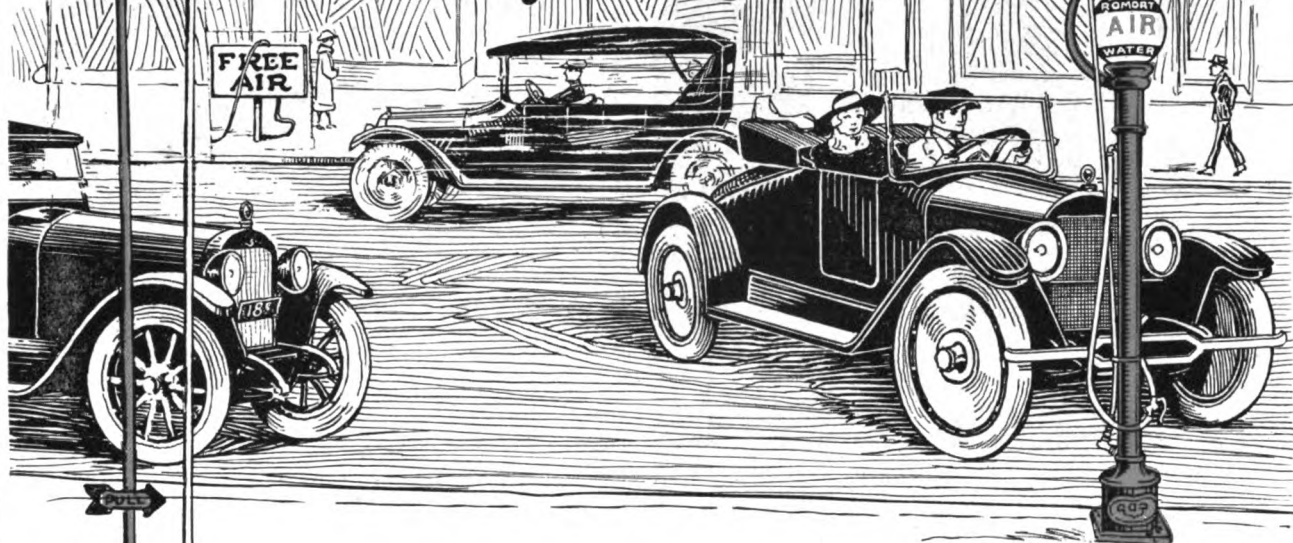


TURNER MANUFACTURING CO., KOKOMO, IND.

TURNER

MOTOR DEVICES

Where They Stop-They Buy.



The Motorist who beats it by your door is nothing in your life.

The Motorist who stops, no matter why, thereby becomes a prospective purchaser of your merchandise or service.

The best way to stop them and get their trade is by means of a

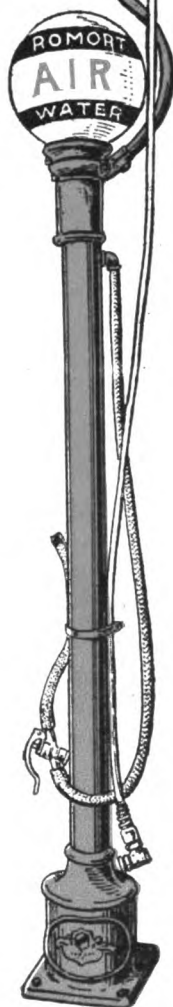
ROMORT AIR and WATER STATION

Its initial cost is rapidly offset by the saving in wear and destruction of hose and connections and its convenience and cleanliness enables the motorist to help himself without soiling hands or clothing or interfering with you or your employees.

Write today for our descriptive circular showing five styles for every requirement.

Manufactured by
ROMORT MFG. CO.
Oakfield, Wis.

Sales Dept.
THE ZINKE COMPANY
1329 Michigan Ave.
Chicago, Ill.





More Power on Less Voltage

The RADD Spark Plug not only improves the ignition of any car, truck or tractor, but is extremely economical in its operation.

The RADD has demonstrated in numerous tests on many makes of cars that it fires on 50 to 60% of the voltage necessary to fire any other plug. The RADD will fire consistently under conditions that cause other spark plugs to sputter and fail.

The RADD produces a small spark in advance, aiding the discharge of the main gap. The result is a larger, hotter spark, a smooth running engine that misses less frequently, and less vibration. RADD plugs will remain freer from carbon and oil deposits, due to better ignition.

EXCLUSIVE FEATURES

The RADD is the only plug—

- that eliminates the time lag from the spark.
- equipped with Auxiliary Electrodes that assist the discharge of the main gap.
- that will cause ignition on a lower voltage.

The RADD Spark Plug is guaranteed by us to be free from all defects in materials and workmanship—also electrical and mechanical defects. Made in many types for all automotive requirements.

DEALERS—Sell the spark plug that gives superior service. Send the coupon today for complete data on the RADD.

LEICH ELECTRIC COMPANY
GENOA ILLINOIS

Leich Electric Co.,
Genoa, Ill.

Please send us complete information and trade prices on RADD Spark Plugs.

Name

Address

American Garage & Auto Dealer

Published Monthly

TABLE OF CONTENTS

EDITORIALS

Signs of the Times.....	9
Unusual Occasions Bring Sales.....	9
Rebuilding the Used Car.....	10
Motors and Railroads.....	10
New License Numbering.....	10

GENERAL

Specializing in Tires—And Service, by Manthel Howe	11-12
Paints, Brooms, Money and Location, by J. E. Bullard	13-14
Fokes Want Snappy Servis Nowadays, by Frank Far- rington	15-16
Territorial Limits of Compensation, by Chesla C. Sherlock	20
Radiators—Methods for Their Repair, by Cloyd Osborn	21-22-23
"Standard Lighting" Ousts "Dimming", by Robert Livingstone	31-32
Installing Bosch System on the Ford, by J. N. Bagley	24-25-32
Glimpses in the Garageman's World.....	26-27
Do You Use System in Storing Stock, by J. C. Cox...	30
Giving a Square Deal in a Blind Game.....	

DEPARTMENTS

Accounting, by J. Newton Boddy.....	17-18
Welding, Cutting and Brazing Practice, by David Baxter	28-29
Practical Hints for Shop Mechanics.....	33-34
Readers' Questions and Answers.....	35-36
Accessories—Dealers' Key to Profits.....	
Up-to-the-Minute Garage Equipment.....	

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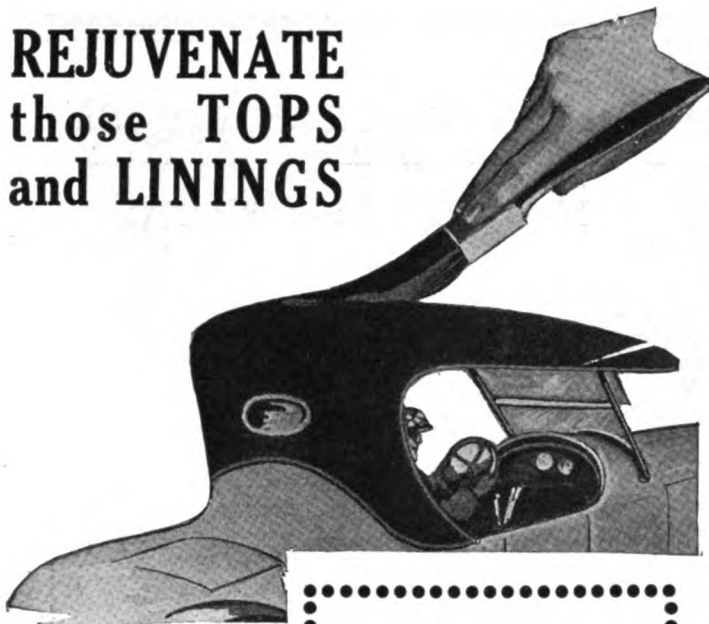
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REJUVENATE those TOPS and LININGS



BURBANK TOP DRESSING (Black)

Re-dyes, waterproofs and re-rubberizes the material, giving the top that nice new appearance and a rich black color. This Burbank Top Dressing is adapted especially to Ford and Willlys-Overland cars having cloth tops, also for the imitation of Mohair Cloth.

Pts. 85c Qts. \$1.60

Also furnished in Olive Drab for light colored cloth tops.

BEATS ALL DRAB LINING DYE

Lends neatness and newness to the appearance of the linings and adds materially to the value of the car. Not an ordinary dye but one made to withstand the most severe weather conditions.

Rich in color, it covers those worn creases where the top folds. One application entirely effaces discolored spots where water has leaked through.

Also furnished in Black and Grey.

Pts. \$1.50 Qts. \$2.75

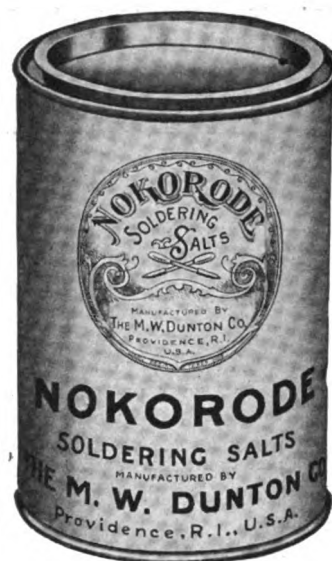
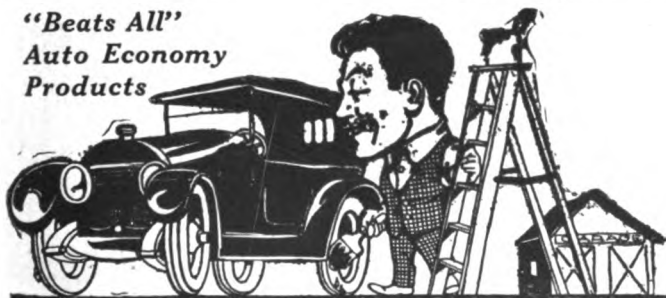
DEALERS—You need "Beats All" Products for your customers and your repair shop—also for those used cars you are fixing up for re-sale. Ask your jobber or write us for descriptive catalog, and Dealers' discount.

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Buffalo, N. Y.

"Beats All"
Auto Economy
Products



As Much Better Than Acid As It Is Safer

sold under guarantee of satisfaction to the man that uses it or we will refund direct to him the full resale price.

NOKORODE SOLDERING SALTS

cut with eight parts of water to one part of Salts will solder all metals; no corrosion; no fumes; no burns; no leaky, bulky containers. Used by large percentage of automobile manufacturing industries throughout the country.

Cut coupon and mail it today

The M. W. DUNTON CO.,
Providence, R. I.

Gentlemen:—

Enclosed find \$1.00 for which please send me a one pound can of Nokorode Soldering Salts. It is understood that these Soldering Salts will satisfy me in every way, or you will refund my dollar.

Name

Address

THE M. W. DUNTON CO.

670 Eddy St.

Providence, R. I.

U. S. A.

Champion Equipment gives the biggest measure of satisfaction for the money

To that end we have developed CHAMPION Air Compressors to their present position of pre-dominance. When you install a CHAMPION you are assured of giving your patrons the best air service in the world at a minimum cost to yourself. Our constant aim is to give users of CHAMPION Compressors the most for their money in service and equipment.

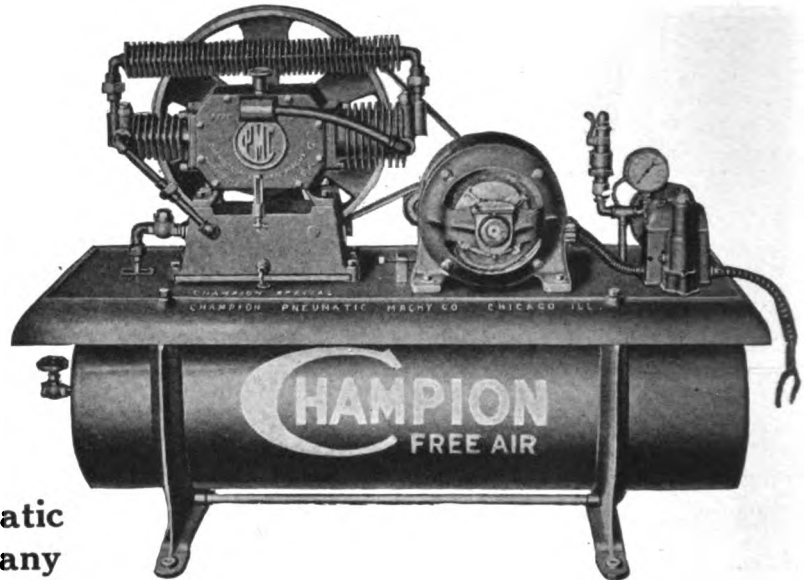
An investigation will convince you that a CHAMPION is your logical air outfit from every standpoint.

Write for literature, Dept. A.

Champion Pneumatic Machinery Company

1403 So. Michigan Ave.

Chicago, Illinois



Every Feature of W & C Shock Absorbers is a mark of superiority

The mechanical construction of W. & C.'s is a big factor in their ability to do what other shock absorbers claimed to do—making riding in a Ford comfortable.

W. & C.'s are the only shock absorbers made with bronze bushings. Their specifications also include steel bolts, malleable castings and all other parts of equal strength and durability. They are made for long and satisfactory service.

W. & C.'s were the Original Double Arm Shock Absorbers for Ford cars, and time has proved the double arm principle to be the only correct one for Ford shock absorbers.

Eight springs are used in the construction of W. & C. Shock Absorbers—which largely accounts for their ability to absorb all jars and jolts.

Over 350,000 sets now in use

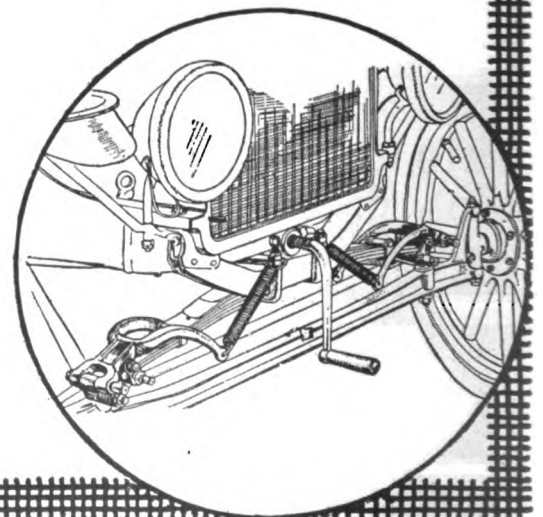
Is adequate proof of the superiority of W. & C.'s. Ford users have learned to appreciate easy riding qualities secured through these shock absorbers.

Price \$12.00 per set of four.

DEALERS—Your profit is liberal, and the demand is great and growing. Write today for our proposition.

P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD-WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



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INSIDE and OUT — The



DALECO TIMER

**STANDS
PREEMINENTLY
The BEST Timer
Ever Put On A Ford Motor**

This is not merely a claim. It is a fact.

The built-in quality of the DALECO TIMER comprises the following structural details:

Bakelite or Condensite Case—A material that is an absolute non-conductor of electricity, is waterproof, impervious to rust or corrosion, and on account of its high qualities is used exclusively for similar parts in the most expensively constructed ignition apparatus.

Pure Copper Contacts—Will not pit, break or burn out.

All Metal Parts Machined From Solid Stock—No stampings, castings or other cheap construction.

True Circular Rotor—No humps, bumps or depressions to cause skipping—jumping and consequent poor contacts and misfires. No deadly "hammer blow" that pounds the common type of timers to pieces in a short time.

All Parts Forming The Electrical Circuit—Solid Brass or Copper giving the least possible resistance and insuring a fat hot spark, a construction that is **EXCLUSIVE** in the DALECO TIMER.

No Moving or sliding parts requiring lubrication.

Wipe System—That breaks the oil film, unavoidable in any timer requiring lubrication, insures clean contacts and a sure and easy start regardless of weather.

Discriminating Car Owners buy the DALECO for their protection and satisfaction.

Wise Dealers sell the DALECO for easy sales, satisfied customers and assured profits.

Manufactured by
DALE MANUFACTURING CO.
1323 Michigan Ave.
CHICAGO, ILLINOIS

Sales Department
THE ZINKE COMPANY
1325 Michigan Ave.
CHICAGO, ILLINOIS



*Every Day
a Sunny One
for you*

**SPEE-DEE is a
wonder for rapid,
consistent turnover**

One of the best features of handling SPEE-DEE is that your stock moves so fast. Only a few dollars are required to carry it and these are exceedingly nimble dollars—producing profits for you every day.

It's so easy to teach the SPEE-DEE habit to any man who owns or drives a car. SPEE-DEE has many uses and there is one thing it alone will do. When the motorist soils his hands in making some repair or adjustment on the road he knows that water won't remove the grease and gasoline means chapped or cracked hands.

But the man with a can of SPEE-DEE just rubs a teaspoonful into his soiled hands and the grease and grime quickly vanish leaving them soft and marvelously clean. No water is needed—which makes SPEE-DEE doubly valuable in cold weather.

Just tell any car owner or driver how SPEE-DEE will clean his hands and he will gladly buy a can. He will find it useful for so many purposes that he will be back—again and again—for more. And he is pretty sure to tell his friends about it. Hence the rapid turnover on SPEE-DEE.

Now is a good time to introduce SPEE-DEE. It makes an ideal Winter leader. Sells at a popular price, yet the trade discount is liberal. We furnish dealer helps and active cooperation in preparing window and counter displays.

**Write us today for our Special
Introductory offer—More Profits**

STATES CHEMICAL CO.

680 W. Austin Avenue

Chicago

SPEE-DEE

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GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 11.

CHICAGO

NOVEMBER, 1921

Signs of the Times.

Pick up a copy of the current issue of any of the popular magazines and note the amount of advertising matter in it. Then take a copy of the same magazine dated last spring or early summer. The current magazines carry the most advertising—and it is increasing each month. A sign of the times.

Unemployment showed a decrease of 1,000,000, the first of this month, over that prevailing the early part of October when President Harding's conference on the unemployed was held. At that time, approximately 3,000,000 workers were without adequate means of support but since then 1,000,000 have secured jobs to occupy at least part of their time.

In the South, some textile mills are operating 12 hours out of 24. Mills and factories in all sections of the country are reopening or increasing their operating time.

From the tire manufacturing centers, come reports of increased output and employment of additional workers. The motor manufacturing plants are increasing their operations due to actual orders scheduled.

More than 200,000 men, it is estimated, will obtain work during the next twelve months through road construction jobs, as about \$150,000,000 is available for the purpose.

Iron and steel production is on the increase. The steel plants are now more than 10 per cent busier than they were a month ago and pig iron pro-

duction shows an increase of more than 40 per cent over the low figure of last July.

Railroads are gradually entering the market as purchasers, several large orders for cars having been already announced this month. During the next three months, it is estimated that the roads will spend \$500,000,000 on maintenance work.

The decline in commodity prices is apparently ended. Dun's "index

Three "Good Ships" in Business.

A lad at a public school was asked to give as briefly as possible the reasons for the defeat of the Spanish Armada, in the days of Queen Elizabeth.

He gave his answer in fourteen words. He wrote: "The defeat was caused by the Spaniards' lack of three ships—Seamanship, Marksmanship, Leadership."

So we might say that many a firm has been lost for the lack of the three ships—Workmanship, Friendship, Leadership.—The Efficiency Magazine.

number" of average commodity prices for October shows an advance of 1½ per cent, despite a moderate decline in metals and a heavy drop in grain.

Statistics of the federal department of labor for the month ending October 15 show a decline of retail prices in seven out of twelve cities where investigations were made. Prices were stationary in three cities and two cities registered advances. All the changes, however, were slight.

Money is decidedly easier. The largest federal reserve bank has cut the rediscount rate from 7 per cent to

4½ per cent. The combined reserve ratio of all the banks is 71 per cent, as against about 43 per cent before the deflation period began.

Some close observers of financial conditions predict interest rates as low as the pre-war level around the beginning of the new year.

These are all "signs of the times" and indicate that the corner has been turned. People are feeling that way and are making plans which involve buying. They are considering now just what will be bought—and now is the time for sowing the seed that will eventually be reaped at the harvest time. What kind of seed are you sowing?

Unusual Occasions Bring Sales.

It won't be many weeks now before Christmas is here, and that is a season when cars and many kinds of automotive accessories can be sold.

"On every unusual occasion," recently remarked a keen observer of business conditions, "the public's purse strings seem to be unloosened, no matter how tightly they are drawn as an every-day affair. The world's series receipts or the football admissions are pretty good examples of this; also business in many lines is good when the circus comes to town.

"The public appears ready to buy for something unusual. That fact ought to help Christmas buying."

The intending purchaser of an automobile should look upon the present as a favorable time to secure a car.

There has been a considerable reduction in the prices of cars in the last year and practically all of the accessories have been sharply reduced in price.

The public has demanded reduction in price and the manufacturers have made reductions which have been such that present prices compare most favorably with those of a few years ago. In fact, predictions are made that prices will be advanced from now on rather than that there will be any more reductions.

These are all arguments which may be used to assist in developing purchasers of cars and accessories during the days between now and Christmas. Time and again it has been demonstrated that business may be obtained by those who "want it hard enough." It's a matter of concentrating efforts on what is to be sold—and results will follow.

Rebuilding the Used Car.

During the winter months garagemen have spare time on their hands—and many of them take advantage of it to rebuild or otherwise rehabilitate old cars which have come into their possession.

The problem of the "used car" is one that has been before the industry for several years and each year has become of increasing importance.

Some garagemen have been most successful in repairing used cars in spare time—and have found it most profitable. Some have even gone so far as to guarantee the cars and one Chicago firm is now going a step farther and entirely remanufacturing them.

The cars are completely disassembled to the frame and then every part is given a thorough inspection before it is put back in place. The cars, when thus "remanufactured," look practically as they did when they left the factory and are said in many cases to be considerably better because defects and weak spots are eliminated during the rebuilding process.

This is rebuilding them on a large

scale, but the garageman in the smaller community can occupy himself in rebuilding on a smaller scale and thus turn into cash time that would otherwise not be remuneratively spent.

We know of one small town garageman who has accumulated about 20 cars which he plans on rehabilitating during the winter months. Undoubtedly in the spring he will find a mar-

PERSONALITY IS BIG ASSET.

Personality is the most important of all human assets. Our success, our popularity, our happiness, our power for good or evil, everything depends on it. Money is not the only riches. There is a possible wealth of personality, which would make money look ridiculous in comparison. No matter how poor a person may be he can cultivate a personality that will make him welcome where the mere money millionaire cannot enter.

The qualities which go to make up a charming personality are kindness, magnanimity, cordiality, tolerance, sympathy, unselfishness, self-sacrifice, and cheerfulness. These are the qualities that attract, that win our admiration and love. Any one who will may develop them.—The New Success.

ket for them at a price that will yield him a good profit. It's the industrious man who makes opportunities.

Motors and Railroads.

The recent threatened tie-up of railroad facilities gave the automotive industry much free "front-page" publicity. Newspapers in every section of the country told of plans being made to take care of the transportation of necessities to the people living in various sections of the country, and particularly the large cities.

Most elaborate plans were worked out so that if the rail strike had become an actuality, motor vehicles would have immediately been pressed into service for both freight and passenger use. The public instinctively turned to the motor vehicles as a substitute for the rail transportation.

The American people, it appears, were outside of the consideration of the factions in the quarrel between the two contending forces. When this

was realized, people immediately turned toward the automobile as a means of carrying on their activities should the rail tie-up really become effective.

The publicity given the automotive industry was certainly most favorable to it, and the plans which were made for the utilization of motor vehicles indicates the reliance which people now place upon automotive transportation.

New License Numbering.

Next season, New York state will try out a new system of assigning automobile license plates. The plan is to allot a certain series of numbers to New York City and also to every county in the state, so that immediate, easy identification of the source of registry of any car may be made due to the number distribution.

It is believed that this will be of assistance in locating stolen cars and identifying violators of highway or local traffic laws and regulations. The police and state troopers will be supplied with full information as to the distribution of the numbers.

Commercial vehicles will be assigned a certain series of numbers, as will also be omnibuses and licenses for trailers and motorcycles.

Naturally there will be objections raised to the plan, for it eliminates the possibility of car owners, who possess political or other weighty influence, of obtaining low numbers—and car owners have, for various reasons, always considered a low number as a veritable asset. Under the New York plan, however, only the governor and others using cars in official and public service duties of the state, will have the honor of cars bearing numbers below 2,000.

It will be interesting to observe how the new number system of New York state, which seems to have practical and common sense merits in its distribution of definite numbered series to distinct localities, will be regarded after being submitted to the test of use.

Specializing in Tires—And Service

The "Tire Specialist" May Be a Newcomer in the Specialization Field But Here's One Who Offers Proof of the Value of Specializing—His Bill-Board Sign Reads, "Our Policy—We Make Good;" That's What He Does

By Manthei Howe

This is said to be an age of specialization. We have dental specialists, baby specialists, eye specialists, and now along comes Oscar M. Fredd and advertises himself as a tire specialist. What is more, he delivers the goods.

Ten miles outside Hancock, on the State Trunk Highway, you can see an immense bill-board sign bearing the legend: "Fredd's Tire Service. Free Parking. Free Air. Our Policy—We Make Good. Hancock, Michigan."

The motorist immediately thinks, "Well, if I have trouble, that's one garage I know of—Fredd's."

From there on, at intervals along the way, boulders in the fields remind one of Fredd's tire service. Inquire of any of the inhabitants, "Do you know where this Fredd's shop is?" Their answer is:

"Sure, on Quincy street, in Hancock. Drive right out until you see his sign."

"Does he make good?"

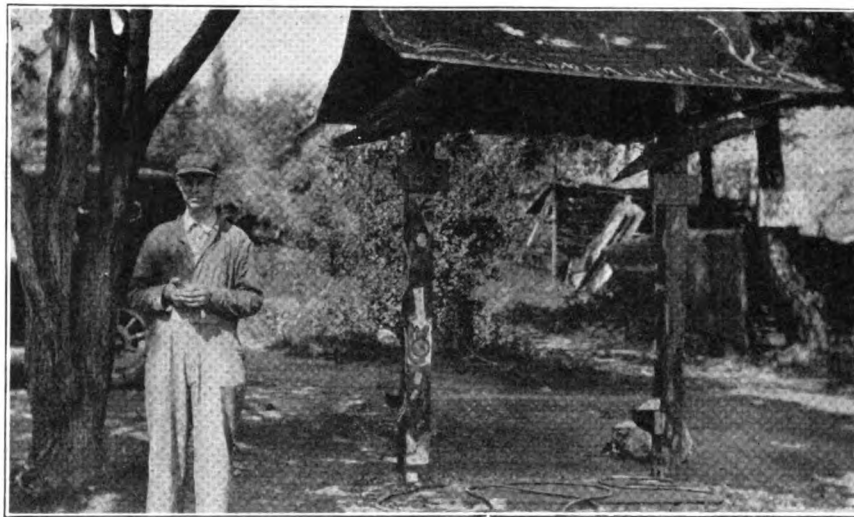
"I'll tell the world he does!"

Fredd is a staunch believer in advertising and evidently his campaign has been wisely planned, for Fredd's tire service is known all over the surrounding county.

His shop is a most interesting place

to visit. You drive out Quincy street until you find a duplicate of the big sign you first saw ten miles out of town. It is big, plainly-lettered and concisely worded. No one but a blind man could overlook Fredd's place.

A small sign invites the motorist needing service: "Drive into the yard. Please keep to the right."



Not "Japanese" But "Philippine-ese" Is Novel Structure in Fredd's Shop Yard.

Obedying the direction, one enters a big tree-shaded yard and, for a person of an investigative turn of mind, the fun begins.

There is a some years' old popular song that advises "Let George do it." That doesn't go at Fredd's tire plant. Here, if anything is needed. Fredd makes it himself.

In the center of the yard is a novel and very attractive structure. It looks like a bit of local color from Japan.

"Who painted that for you?" we asked.

"Oh," smiled Fredd, "my brother served in the Philippines during the war. He brought back the idea. We constructed and painted it ourselves."

Just as one might say, "I walked down the street." Although anyone will acknowledge that the originating and decorating of such a structure is a far cry from tire repairs.

The signs "Station 3" and "Station 4" that appear in the illustration mark the two free-air stations. There are five in all, with one for heavy duty truck tires.

As indicative of the real service Fredd gives, there is one station bearing the legend: "Night Air Free. Welcome. Please Close the Valve."

All these signs, as well as the larger ones used, are painted by Fredd, so he gets an immense advertising value out of every actual dollar invested. He actually spends about a thousand dollars a year for advertising but so much of the work is done by himself that his \$1,000 goes about as far as another man's \$2,500 would. For instance, in the open market, it would cost \$200 to duplicate the sign down beside the trunk highway. Fredd said



Fredd Is a Staunch Believer in Advertising and His Tire Service Is Widely Known—Complete Service Wagon a Part of His Equipment.

it cost him the small sum of \$60.

The Fredd tire service station does tire repair work, wheel aligning and brake adjusting. It sells automotive accessories, tires, oil and gasoline. So, it is in truth a specialty shop.

All the gasoline used, instead of being pumped by hand, is operated by compressed air. The gasoline tank, with a capacity of 1,800 gallons, has been fitted up by Fredd. He anticipated trouble with the compressed air when the tank was in operation but he found that this was a bridge he really never had to cross. When the tank has about 900 gallons of gasoline, one filling of 15 pounds of air is enough to draw out 150 gallons of gasoline.

All the mechanical niceties on this tank, he has evolved himself. The tank in front of the shop shown in the illustration was rigged up from a boiler. It is a home-made affair, although no one would ever know it.

The service station has three self-measuring Bowser oil pumps, with the usual three different grades of oil.

Fredd has the agency for the United States tires and the Fisk tires. The customer who purchases one of these tires receive what Fredd calls a guarantee of service. It is a small card bearing the information shown elsewhere on this page.

And Fredd lives up to all this warranty with a bit over. He is able to handle the pneumatic truck tire service satisfactorily because "necessity is the mother of invention." He saw that the usual trouble in tire repair of this nature could be laid to the tire mold, so he went ahead and invented a mold to take care of the difficulty. He has already received two patents and another is pending.

These patents cover equipment consisting not only of a set of molds but a complete equipment for doing pneumatic truck tire repair work, from a small deep tread cut to a complete retread on every size tire from 36 ins. by 6 ins. up to and including a 48 ins. by 12 ins. tire.

In a retread job, he uses a steam coil, imbedded in a matrix—"Fredd's inner-tread heating matrix"—underneath the sand-bag, as well as heating from the outside as in ordinary dry cure.

In vulcanizing small, deep tread cuts, another part of the vulcanizing equipment comes into use—"Fredd's inside spot block."

In doing sectional jobs, instead of

using the regular air or steam bag within the tire, a quicker and better method is possible by using "Fredd's heating air bag," which makes it possible to use a full head of air for pressure and to immediately heat this air for pressure—with the inside heating device in the bag—to the temperature

Customers' Protection Warranty.

This tire bearing Serial No. is a first quality tire and will render satisfactory service when used with ordinary care.

Should it, for any reason, need attention we, Fredd's vulcanizing plant at Hancock, Michigan, will repair small defects and small cuts free of charge.

Should it be necessary to return the tire to the factory, we will prepay shipping charges for our customers.

Large repairs caused by accidents or abuse will be made at one-half our regular printed price.

Road service on tires purchased of us will be free of charge up to five miles.

Inspection and air service on our tires will be free at all times.

Wheel alignment inspections free on all cars and tires.

All repairing will be done only by expert workmen.

Call and see us, you will get prompt attention and courteous treatment always.

We are the only vulcanizing plant in northern Michigan equipped to properly repair and retread all sizes pneumatic truck tires from 32 x 4½ to 48 x 12 inclusive.

Fredd's Vulcanizing Plant.

best suited to the job, making a better cure and cutting down the time in curing sectional jobs by curing from both sides during the entire time of the cure.

Another advantage of the Fredd vulcanizing equipment is the ease with which the molds, which are adjustable, can be thoroughly cleaned. It is as simple as clearing off the top of a table.

To take care of the free road service up to five miles, Fredd uses the truck shown in one of the illustrations. This truck carries a compressed air tank.

For the tire service over the five-mile limit, he uses a Hudson touring car.

Four men besides Fredd himself are employed in the plant. The oldest employe, in point of service, has been with Fredd since he began his tire-service repair work, nine years ago.

Mr. Fredd is a native of Hancock

and, although only 31 years old, he has already accomplished more than most men double that age. The secret of this is that he likes his work. He has the true specialist's interest. His business and profession are also his hobby. That is why he says: "I wish there were 24 hours in each day that I could devote just to this work."

He absolutely lives up to his slogan "We Make Good."

He accomplishes this because he adheres strictly to a plan of square dealing.

"My father, as a painter, turned out work he never needed to be ashamed of. He had a reputation for honesty and straight-dealing," explained the genial tire specialist. "Well, I expect to live in Hancock a long time. I want to turn out work of the same high quality as my father's. To do that, I just have to live up to my business slogan."

All of which goes to prove that the really successful businesses are those built up on a real ideal.

Standard Tests for Automobile Brake Linings.

At a conference recently concluded at the United States Bureau of Standards, Washington, D. C., recommendations were made for a standard method of testing brake-lining materials for automotive purposes. The engineers of the bureau discussed these recommendations with representatives of nearly all the manufacturers of this class of material, as well as of the Motor Transport Corps of the army and the standards committee of the Society of Automotive Engineers.

In view of the very large quantities of brake-lining material used in automotive vehicles today, the establishment of standard test conditions, which may be used by all makers and large users and which can form the basis for purchase specifications, is of considerable importance; not only to the industry but also to the public.

Such standards, carefully planned, tend to bring about a greater uniformity of the materials concerned and, by establishing a better understanding of the essentials, leave the manufacturer free from unnecessary restraint in other directions.

At the suggestion of the Motor Transport Corps, the Bureau of Standards, about a year ago, undertook an investigation to determine the most suitable conditions for such standard tests, and this conference was called to explain to those most interested the results of this work and to discuss proposals based upon these results.

Dr. S. W. Stratton, director of the bureau, opened the meeting with a short address, in which he dealt with the work of the bureau in general.

Paints, Brooms, Money and Location

"Paints, Brooms and Money," Says This New Hampshire Garageman, Are His Recipe for Success in Automobile Business—These and a Wise Choice of Location—Finds Assembling Plant Separate from Garage Most Satisfactory

By J. E. Bullard

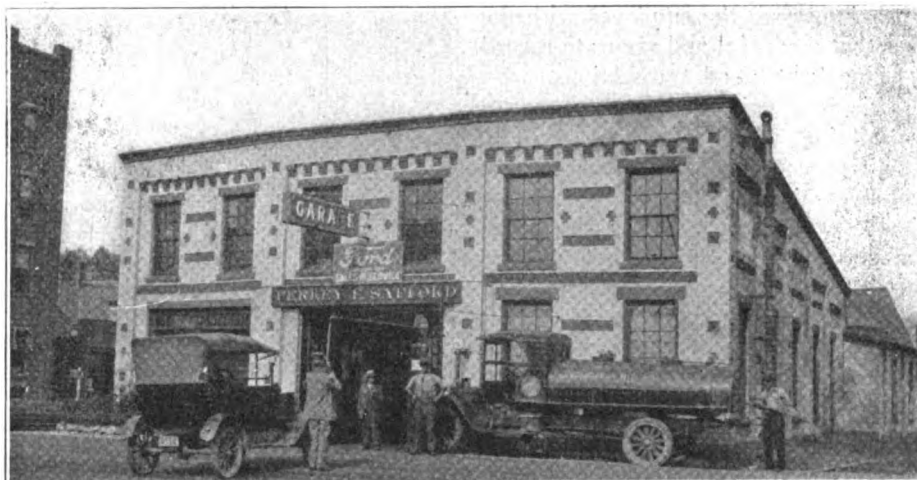
Right across Main street, in Keene, N. H., run the railroad tracks. On the west side of the street, and north of the tracks, is the railroad station. On the east side, and south of the main tracks, there is a building once used for a roundhouse but which, since all three roads entering the city have been consolidated into the Boston & Maine system, has not been needed for this purpose.

For years this was a smoky, dirty building which was almost an eyesore. Then a man rented it to use as a garage. It was fixed up a little, yet did not then add anything to the beauty of that section of the city. The garage was not a huge success.

In the course of time, Perley Safford bought the lease to the place. Safford holds that three essentials to success in the automobile business are: Making a liberal use of paint, using the broom freely, and always being short of money.

By being short of money he means keeping every cent in the business at work. The bank balance and the cash on hand in the cash register or office safe, according to Safford, should be kept down to the point where every cent is needed. If there is more than is needed, the business should be expanded and more business done.

One of the first things that Safford did when he took possession of this old roundhouse was to start painting. He painted outside and the inside. He changed the appearance of that build-



Safford's Garage, Keene, N. H., Once a Railroad Roundhouse, Attests the Efficacy of "Paints and Brooms."

ing to such an extent that one who knew it 15 or 20 years ago would not recognize it today. He was not satisfied with this, so he planted a flower garden in a spare lot of ground in front of the structure.

He was taking a chance when he did this, because no long lease will be given on the building. The railroad retains the privilege of taking possession of it at any time by giving the tenant 30 days' notice.

Nevertheless, Safford went right ahead and renovated it until it actually looked like a new building. He felt sure that changing the surface would save the profits. Now it is a very attractive spot at which to stop for a tank full of gasoline and the oil that is needed in the crankcase.

Once cleaned, the place is kept clean

by a liberal use of the broom. No dirt is allowed to collect and when the broom, aided by soap and water, does not give the place a fresh appearance, a little additional paint is applied.

One of the most interesting things about this man's business, however, is the way he makes his money work. He has simplified his accounting system until one girl is able to do the bookkeeping—yet he has an accurate record of all stock and all transactions.

Instead of having a number of special forms, all transactions are recorded on a recording machine—one of those machines having an opening through which one can write on the paper, and a roll of paper which is wound on another roll as the entries are made. Anything that is sold, or taken from the stockroom, is entered on this machine.

When gasoline is sold, the number of gallons is not entered but the reading of the gasoline pump. This means that, if a mistake is made or a sale of gasoline used in one of the company's cars is not entered, the error is at once evident. All that is necessary is to compare the readings and it can be ascertained just when the unrecorded gasoline was pumped from the supply tank.

This tends to make the employees more accurate than they would otherwise be. They know that they cannot make a mistake without having it



Safford Finds It Better to Have His Assembly Plant Separate From His Garage.

show up at once and, as a consequence, they are more careful about making accurate records of sales.

Checking this record against inventories also shows when any stock is used and not recorded. The system is simplicity itself, yet it gives all the information needed by a concern doing business in a small city. Above all, it impresses the employes with the fact that a careful and accurate record is being kept of all transactions.

This is a point that is well worth considering when using any system. The moment that it appears to the employes that the owner is careless about keeping track of his stock and the goods he is selling, they will be careless about the way they are using it.

Only a few years ago, a certain automobile manufacturer took over a number of service stations that had formerly been operated by private concerns. In the case of one of these it was found that it was hardly paying expenses, and that the cause was due to carelessness in keeping track of the stock and the business transactions.

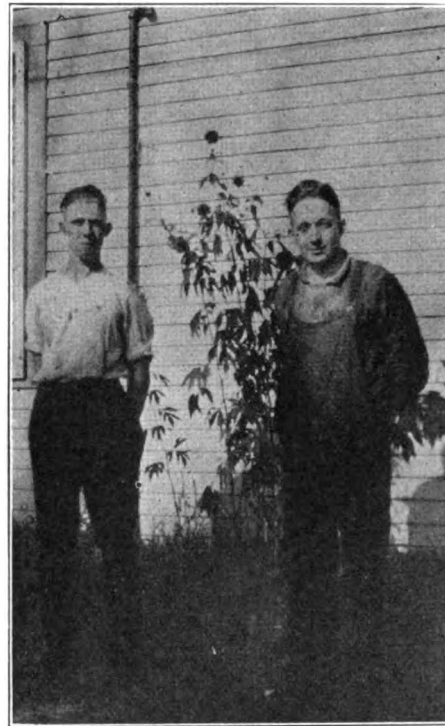
Safford, though he has a system that requires little more time and attention than the system which was used in that service station, does have one that keeps a record which is complete and accurate and a record that each and every employe can readily see is complete and accurate.

A complete record of repair jobs is kept on a small, numbered card. At the top of the card, there is an identification tag which is given to strangers when they bring in a car for repairs. On the card proper, there is the number of the tag, the date, the name of the car owner, his address, his license number and the time the job is promised.

Under this, come instructions to the workman in regard to the repairs to be made, and under these instructions are columns for the date, the part number and the amount charged for the part. These columns also take up about half of the reverse side of the card.

The remainder of the card is used for a record of the labor—the date and the name of the employe being filled in and the time of starting and of stopping being stamped in on the time clock. When the work is finished, this card contains a complete record of the job and is used by the bookkeeper in making out the bills.

Since each card is numbered and every card must be accounted for, this prevents any jobs being overlooked. As the employe's time is recorded on this card and he cannot get his pay until this is checked up against his



This is Safford's Ford Assembly Force.

weekly time-card, no employe is going to be so careless with a card as to lose it. The result is simplicity combined with accuracy. This means that every dollar spent in keeping records secures the greatest possible results.

Safford sells Ford cars. This means that he has them come by the carload and that a certain amount of assembling is necessary. There isn't room in the garage he operates to do this assembling, so he has a building about three-quarters of a mile away, on the outskirts of the city, where two men are employed to do this work. The cars are towed to and from this building and, at first sight, it might seem an extravagant way of doing business.

However, Safford is saving about 93.5 per cent of the rent he would have to pay if he had a building nearer his garage, and he finds that the two men in this building—which is 165 by 170 feet and three stories high—are able to get more work done than they would if they were working right in a garage where they would be interrupted to a greater extent.

That assembling plant, however, though it is on the Main street, is not

a good place to sell gasoline. A pump has been installed there and gasoline is sold at a cent a gallon cheaper, but 1,200 gallons are often sold at the garage in the same time that nine gallons are sold at the assembling plant. One location proves the best for getting work done and the other for making sales.

In the garage, Safford always has plenty of work ahead of the men. He has found that they work harder if there is something always ahead. He also endeavors to have the hours of work regular—the men coming to work at seven in the morning, leaving for lunch at noon, and returning at one to quit for the day at six.

Of course, it is sometimes necessary to depart from this practice but every effort is made to stick to regular hours, because it has been found from actual practice that every dollar spent in wages means better results if the men do have regular hours.

In the garage, double service is gained from the floor space. Keene, N. H., is located in a great tourist section. The garage is right on the Main street, where every tourist entering the city is quite certain to see it. This means that many of them leave their cars there for the night. It also means that the working space used in the daytime can be used for storage space at night, each car owner paying a dollar a night for storage of his car. Incidentally, this means additional sales of gasoline and oil.

Keeping the paint brush, the broom and the money used in the business busy has resulted in a profitable business, where less attention to any one of these three things would have meant less profit and perhaps an actual deficit. Safford's recipe for success is: "Get the right location—and then use paint, brooms and money."

October Meeting Automobile Accessories Business Assoc.

The October meeting of the Automobile Accessories Business Association, held in Philadelphia, is reported as a well-attended and enthusiastic meeting. Nominations of officers and directors were made, President W. N. Metcalf being re-nominated.

This association has been actively engaged this fall in numerous events and in assisting the fight of legislation detrimental to the automobile industry.

Fokes Want Snappy Servis Nowadays

Up-to-Date Tools Save Time, Pete; You Dont Find No Old Fashioned Make-shifts in Our Garaj—Persy and Polo Had a Chewing Match an the Boss Gave Us a Good Talk—He Sez Arguments Can Be Awful Bad for Enny Bizness

By Frank Farrington

Deer Pete:

Hows everything in old Pinkvill, Pete? Hav they had the annual fire-mens paraid yet? Gee! That used to be sum day, Pete, and you and me was torch boys!

I was sweeping out the offis this morning when Sally cum in, and I sed "Good morning, Sally," and she sed snapily "Miss Rader, if you pleez."

Well I wundered how she got that way becaws when we started home yes-tedy we stoppt in the greeks and I bawt her sum ice creem and we held hands under the tabel and she was nice as pi. I says "All rite, but whats the big idee? Did your d reem book giv you sum rong dope on me?"

And she sed, "My friend Persy informed me last evening that you calld me 'Sallyratus' in his presence and I will not be called by such an awful name."

"Oh splush!" I sed. "If you buleev all that nutty mutt says you'll be buleaving next Ide murder Missis Hecker for giving us a party. I aint menshond that name except that nite we first met and I was kidding you about it and it made you mad. Whered you see Persy last nite ennyway?"

But she woodent say ennything more about it and I got to put sum-thing over on Persy or Ile bust. Whats he butting in for ennyway? I got to do a littel detectiv work on him. I saw him punching up the "No charge" sine on the cash rejijster yesterday when he sold sum gas. Ile bet heez as crookid as a pretzel.

We got a new cash rejijster cumming ennyway, a regguler one that old Persy cant munkey with. One thing about our boss, heez always getting the latest kinds of things for his

bizness. You dont find no old fashond tools in our shop and you dont find us working with makeshift things when theres a reel tool for that job.

Ive herd him say moren once that if enny of us heers of a better machine or a better tool for doing ennything around our place he wants us to tell him so he can find out about it and get it if its reely better than what weev

time, and heez reddey to spend a littel munny to get that way.

I gess heed be glad if they was sum way he cood hav Persy made over into a more up-to-date model so heed work fast enuf to keep up, but Persy aint heer to work fast. Heez heer becaws the boss wants to keep in rite with his sister—thats Persys mother.

Persy and Polo got into a chewing match today and I gess theyd of ended by chewing eech others eers if the boss haddent stoppt em. Persy wassent in the AEF and he wassent in a traning camp and he wassent a welfare worker and he wassent a libberty bond sails-mun and, far as I've found out, he wassent ennything but one of theez fellers that kept warm by the home fires sum-body else kept burn-ing.

And Polo was one of theez fellers that wassent ennybody in

partickler before the war and got to be qwite a feller over there in the Rgon, and then wassent much of ennybody after the government got thru with him becaws republicks is ongrateful.

Well, he and Persy argued becaws Polo calld Persy a slacker and Persy sed he had to take care of his mother. Good nite! His mother has to take care of him or heed starv to deth. I was just wishing Polo wood biff him one on the beene when the boss herd the noiz of battel and cum out in the shop where Persy had butted in.

I cood see the boss lissening a minnit before the rest saw him. He was getting a line on wich side was rite if he cood, and I gess he woodent haf to gess but once. Then he sed:

"Ime sorry to prevent this argu-ment from cumming to a fatal end, but I cant hav arguments on shop time.



Persy and Polo Got Into a Chewing Match Today and I Gess Theyd of Ended by Chewing Eech Others Eers If the Boss Haddent Stoppt It.

got. He aint afraid to spend a littel munny for ennything that fixes it so the fellers can do their work better or faster. I spoze he dont put as much munny in his pockit that way at first, but he makes more in the end and I gess heez in bizness to stay a wile.

Why look how much less time you keep fokes waiting for gas when you pump up 5 gallons with a up-to-date pump almost as qwick as you pump up one gallon with the old well-curbs they used to use all over. I spoze theres sum places where they carry out gas to you in a bucket yet.

Fokes want snappy servis nowadays, aint it the truth, Pete? Dont they like to be waited on in a minnit in the store? So the boss trize all the time to keep fixing it soze we can take care of more customers and do it in less

It costs too much. I like Polos line of talk and I think Persy mite be benefitted by having it work out to a conclussion, but its agensst the rule. In other words, cut it out. And wile Ime talking about arguing I got to say that Ive seen sum of the fellers arguing a littel too much with customers sumtimes."

He ment Persy becaws Persy is always getting into a argument about wet and dry or about demmycrat and republican with fokes that cum in and sumtimes they get a littel hot under the collar.

"Nix on arguments with customers," sed the boss. "Mebby your rite and mebbby youre rong. I dont care. I dont care if the customer says Wilson was a failyer or the gratest pressident that ever was. I dont care if he says rum

runners is the world's gratest fillan-thropists or if he says the country going dry is what made bizness all shot to hell last winter. Let em rave. If you dont agree with em, keep still. If you do agree, say so.

"You cant send a man away feeling good after youve argued with him, espeshully if you beet him at it. Being a good arguer may be an awful bad thing for bizness. Nobody dont want to be proovd ennything. They want to speek their peec and get away with it. Let em. Who cares? Weer heer to make munny in the garafe bizness, not to educate the peepel about pollyticks or booz."

That was a pretty good line of talk for all of us. Ile say so, Pete. And being what it was there wassent enny chance for us to cum back with enny

argument agenst what the boss sed, so we shut up and so did he, and Polo and Persy is likely to cum to the end of their qwarl after hours—if Polo can get Persy to stick around, but Persy aint looking for enny bad ending to his arguing. He dont want to get a poke in the jaw and buleeve me Polo is sum poker whether he was a kernel or a buck privit.

You oe me 2 letters Pete. Whats the matter with your fountin pen or have you got riters cramp riting letters to that girl that vizzited the bosses wife last month that you did-dent tell me about. O you Pete, Ime onto you. And speeking of that, Sally never sed a word to me all day or when she left.

Your old pal.

BILL.

Are You Getting the Money Due You?

Exchange of Ideas in Business Through Medium of Business Clubs Makes Better Business—They May Furnish Ideas for Collecting Those Long Over-due Bills—Decide Upon the Best Method and Then Go After Them Hard

By Frank E. Morriss

When one has sold automobile tires at retail for four and a half years, and all of that time performed tire service for his patrons, he has accumulated a vast store of knowledge with regard to credits and credit risks. Out of the store of that experience he should be able to give a tyro, or for that matter an old head, in the business some pointers that will prove valuable.

The exchange of ideas in business is what makes better business, and merchants everywhere are taking kindly to the clubs of Kiwanis, Rotary, Conopus, Automobile and others where men meet for this very purpose. Look at the Chamber of Commerce, and you will find that it is doing its most effective work in making men broader and better business men through discussion of business problems. The Chamber of Commerce has so successfully operated, on an average, that it has made possible the Junior Chamber of Commerce, which gathers together the younger employed men, as well as the younger business men, with the avowed purpose of changing business for the better as future generations come upon the business stage.

So then out of a long credit experience covering several lines of business, and backed up with a tire experience, I shall attempt to say something that will be of vast benefit to the garage owner. Recently I have changed my occupation, with a view to offering the garage owner, as well as any business man in any line, something that will bring about a change

in the credit world. This business brings me face to face with the owner and the credit man of every line of business, and as I have made hundreds of calls on garagemen, they are especially chosen to be made the target for this address.

The war brought upon us the idea of "Cash for all parts and repair work"—that is to say, the war brought us an excuse to put into practice this idea. For years garagemen were suffering from unpaid bills, and disputed bills. They realized that a car owner is the most dissatisfied person in the world after he has had his repairs done on a credit basis and the bill is presented. It was no uncommon thing to hear staid business men accusing all sorts of repairmen of being crooks. Disputed bills were as common as the proverbial hen's teeth are scarce. So with the war we slapped up the sign, "No Credit, Pay as You Take Your Car."

Whether or not this is good practice is left for another discussion. What we intend to present in this practice is your unpaid bills. Many a garage owner has his "Profit and Loss," his "Delinquent," and his "Skip" lists. What are they doing with them? Some are before the war lists, and some are those, whom despite their cash basis policy they have been soft enough to credit.

Most of them are dreaming about these lists, saying "When my ship comes in." They mean when they are paid what is due them. They have exhausted every effort, they think, to collect these bad debts, but

have they? They have not, is my observation. A great number have been induced to try other methods or another method. These men are beginning to see that there is "something new under the sun." Consequently they are looking up, and taking on a cheerful grin.

One of these garage owners has written: "I am using ——— system on 18 of those old 'hard shell' accounts. To my previous statements and attempts to collect. I could get no answer. They are regular 'dead beats' but I am glad to say that the majority of those 'dead beats' have come to life and are paying now. Some replied to my letters of the system: 'I am sorry I cannot pay now, but will pay soon.' Others have said: 'What in thunder are you sending me those letters for, I will pay as soon as I can.' Those plug-hat beats have paid so far nearly 100 per cent of the money they owed me."

Mr. Garageman are you getting the money that is due you?

Remember you had to pay for the parts that went into the job, and you had to pay your mechanic's wages. All of that was actual cash, which you are out of pocket. You should get that as well as the profit that you charged against the job. You are entitled to that, and really to a collection fee in the shape of interest, but do you get the principal?

If not, resolve today that you will, by searching, find out the best method of getting your money from those you credit, and get it.

Accounting:

In this Article the Importance of Correct Inventories of Stock Is Discussed—Accuracy of the Financial Statement Is Dependent Almost Entirely Upon the Accuracy of the Inventories—Some Convenient Inventory and Ledger Forms Illustrated—The Problem of “Work in Process”

By J. Newton Boddy

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

The accuracy of a financial statement depends almost entirely upon the accuracy of the inventories. As most garagemen take an inventory once a year only, it follows, that only once a year do they know accurately where they stand, if they have no other method of arriving at an inventory. The man who keeps a perpetual inventory of his stock can always make an accurate financial statement on short notice.

The difference between these two men is the difference between the man who guesses and the man who knows. If you will go back to the AMERICAN GARAGE & AUTO DEALER for November, 1919, you can review a very important article on garage accounting—"Taking an Inventory of Your Stock," which shows forms for inventory tag and inventory sheet.

With your inventory properly established, it is an easy matter to perpetuate it. This may be done in two ways—either by quantities or by dollars and cents. The better way is to combine these two methods. Keep your stockroom records by quantities and your office records by dollars and cents. Then check one against the other at regular intervals.

Some garage accountants keep all in-

[illegible]

Suggested Form, Reduced Size, for Inventory Sheet.

ventory records in the stockroom and furnish a cost of sales statement periodically from a perpetual physical inventory. We believe, however, that every bookkeeper should determine his cost of sales daily and then check the

resulting book inventory in dollars and cents against his physical inventory.

Great care should be taken that every addition to or reduction of stock is properly recorded. Two forms of great assistance here are the purchase

[illegible]

Garageman Who Does Considerable Business In Supplies and Parts Should Carry Stock Ledger in Some Form.

"Work in Process" is often a considerable item in an inventory. Where such is the case, we always recommend the keeping of a job ledger. Look over

[illegible]

What about "Work in Process"?

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Territorial Limits of Compensation

Conflict of Compensation Acts Makes It Important to Employers to Know Exactly What Law Applies When Accidents Occur in Other States—Differs From the Usual Legal Rules — Extra Territorial Effect Briefly Explained

By Chesla C. Sherlock

It may seem slightly beside the question to state that the average garage and automobile dealer has a vital interest in so prosaic a subject as the conflict of laws. Such, however, is the case. Suppose we take a concrete example.

You remember Sanderson? Well, Sanderson, a typical garage and automobile dealer, finds himself pinched by the freight situation. His garage is located but 50 miles from the factory where he buys the cars he handles. He decides to send some of the men to the factory to "drive" his latest order of cars overland to his shop. The factory happens to be situated across the state line, where the compensation law is materially different from the one under which Sanderson ordinarily operates.

Suppose that one of Sanderson's men has a smash-up while driving home one of these cars and receives injuries which cripple him for life. The accident occurred in the other state where a workman is permitted by the law to recover 75 per cent of his average weekly wages, while in Sanderson's state such a workman is permitted to recover only 50 per cent. The workman claims that, since the accident occurred outside the state, he is entitled to receive compensation on the basis allowed by the more favorable law.

Sanderson's insurance carrier, on the other hand, points out that it had received premium payments on the basis of the local law; that its policy limits its liability to the said law; and that it will not pay the claim of such workman. Sanderson is then in the position of being the goat and of having to pay up a claim independent of his insurance protection—if these contentions of the several parties are correct in law. Do you see the "rub"?

This thing, with variations, is happening hundreds of times every year to employers all over the country. If you could see the reports of dozens and dozens of cases tried in the courts in the past year upon this one point alone, you would appreciate the fact

that it has something of value to each and every one of you.

There is a general rule of law to the effect that no legislative body has any power to enact laws which shall be in force beyond the territorial limits of the state or municipal corporation it represents. Everyone realizes the reason for this law upon taking proper thought. It would be absurd to say that the legislature of Illinois, for instance, could pass a compensation law that would apply to the employers of Iowa. That, keep in mind, is the general situation.

But the compensation system is so full of unexpected turns that we cannot jump to conclusions and assume that what is true in the general run of law is true in case of the compensation system.

However, it is well recognized, if a contract of employment is made in one place for work to be done in another place, that the contract shall be binding. If it is necessary to interpret that contract, the law of the place where the contract is made shall govern—no matter what the law of the place where the work is to be done may be. Thus, a contract may be illegal in Iowa, but if it was legal in Illinois—where entered into—it will be interpreted by the Iowa court in view of the Illinois law and enforced according to it.

In Kansas, the court said: "The operation of our statute is not, in so many words, limited to this state. It contains, however, some incidental expressions implying an assumption that the injuries to which it relates would occur in Kansas."

In West Virginia, the court said: "Was it intended to deprive both the employer and the employe of the protection provided by the act when the injuries of the employe should occur just across the line in another state, and where, as in this case, the principal works are all located in this state? We cannot think so. So construed the statute would impose unequal burdens upon and give unequal protection to employer and employe from whom premiums are exacted. They would

both be liable for benefits not received."

In Rhode Island, it was held that the compensation act was to be read into every contract of employment and that, therefore, "it should be construed and held to include injuries arising out of the state as well as those arising within it." The same rule is applied in Indiana. In Minnesota, the court reached a similar view, saying boldly: "The weight of authority supports the view that, under an elective act like ours and with facts such as are present, an accidental injury—though it occurs outside the state—is compensable. This view we adopt."

Massachusetts, however, held that an accident occurring in Maine would have to be compensated according to the Maine law and not according to the Massachusetts act. California, likewise, adopted the view that, in the absence of an express provision in the act itself, the compensation law has no extra-territorial effect.

New York draws a distinction which comes nearer to our conception of the true spirit of the compensation system, and, at the same time, harmonizes with the old rules concerning conflict of laws. It says: "The statute in question is intended to regulate the relations between the employer and the employe in hazardous employments within the state; to protect the employe within the state from the ordinary risks of employment; and to charge those risks upon the ultimate consumer."

"The mere fact that an employe is engaged by a resident of the state to go out of the state for service, and no service in the state is contemplated or done, cannot bring the employment within the act. Ordinarily, a statute has no extra-territorial effect, but where the regular service of the employe is being performed within the state, and, as an incident to it, he goes over the state line temporarily, we have held that such temporary absence from the state does not relieve the employer from liability under this statute."

Radiators—Methods for Their Repair

Take Plenty of Time for Job but Make Every Move Count as Speed Is Essential—Equipment and Arrangement of Workroom—Cleaning the Work Is Most Important Part of Job—Repairing Leaks in the Tubular Type Radiators

By Cloyd Osborn

Speed is essential in this work. Plenty of time must be allowed for the job, but each move must count to the limit of its possibilities. Be as painstakingly thorough as complete concentration of your whole physical and intellectual attention will make you.

When your work drags and you cannot accomplish anything, you are puttering. The putterer is lost. Go eat a sandwich, take a cool drink, or get someone to tell a funny story. While thus occupied, relax, banish your work from your mind. Fifteen minutes later you will be surprised to see your troubles yield to your renewed vigor.

Do not attempt to obtain the skill necessary to perform the repairs described in this article at the car owner's expense. It is better to first perfect at least one each of the jobs, on a junk radiator. This will give the junk radiator a value, and give you experience, which will enable you to attack the other fellow's job with confidence.

Your reputation as a radiator repairman depends upon the work you do. Your limit in this field of endeavor is the sky, if you always turn out perfect work. In theory, this is possible. In practice, constant endeavor makes it almost possible.

First, we must have the radiator off the car. Make a kit box to keep a set of screwdrivers and wrenches in for removing and replacing radiators. Make a compartment to keep stovebolts in, another to keep hose clamps in, another in which to keep a quart

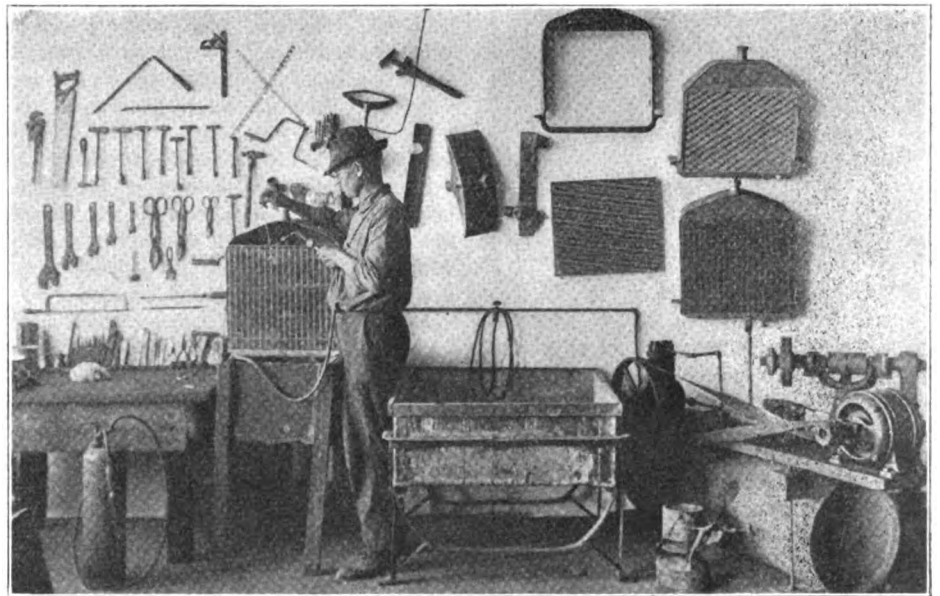


Fig. 1—A 100-Candlepower Trouble Light Should Be Clamped on Your Cap on Dark Days.

can containing a couple of inches of stiff differential grease and a cheap paint brush.

When removing a radiator, place the kit as convenient to your hand as practicable. When possible, loosen the clamps where the hose is clamped onto the radiator inlet and outlet, taking care not to disturb the other hose fastenings. This saves time in replacing the radiator, as you have only to tighten the clamps which you have loosened.

The radiator off, examine the hose to

see if any new ones are required. In case there are, remove those to be replaced, put them in the kit box, and take the box and the radiator to the workroom.

The workroom should contain plenty of natural light. In addition to this, a 100 candle-power trouble light should be clamped on your cap on dark days, Fig. 1. The trouble light may also be used in locating difficult leaks. A wire stretched over the workbench, above the head, will be handy to hang the light on at other times.

A workbench, test tank, and compressed air supply are essential. For air, a tire pump can be used, but a supply tank with a motor-driven pump is better. A centrifugal air pump, driven by a tenth-horsepower motor, made especially for radiator repairing, has been put on the market.

The test tank should be made of galvanized iron—No. 22 gage is best—with a rim of 1-inch by 2-inch soft boards around the top to protect the radiators from the sharp tank edges. Make the tank a foot deep, and 32 ins. by 36 ins. in dimension. This will hold almost any radiator made. For the workbench use 1-inch boards of soft wood.

Make a box, a foot deep and 15 ins. by 26 ins. inside. Stand it on end and nail two boards, 30 ins. long and four ins. wide, to the corners for legs. For the legs on the other end, use boards 50 inches long, letting 20 inches of them stick up above the box for a rest to prop the radiators against.

This is also the back end of the bench,

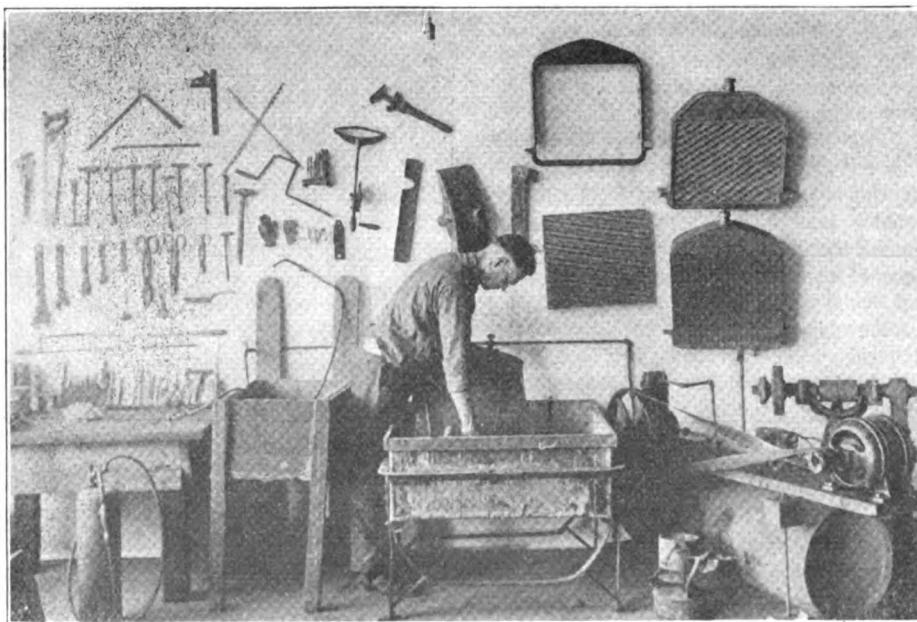


Fig. 2—Place the Radiator in the Tank and Cover It With Water.

Fig. 2. With a little practice any radiator can be propped in any desired position on this standing box. Set it beside the tank.

The acids and fluxes will be left largely to the repairman's own choice. The acid most extensively used is muriatic acid. The raw acid is used for cleaning purposes

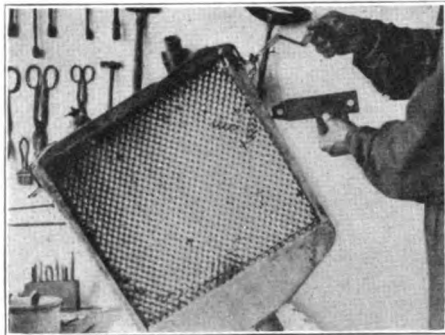


Fig. 3—Support Soldered to Bottom of Radiator.

while, as a flux, it must be cut with zinc. To cut the acid, place it in a glass or earthen vessel and put into it pieces of pure zinc, continuing this process as long as the acid will consume them. We will call this the soldering fluid.

It can be applied with any kind of a swab—preferably a small paint brush or a round bristle brush with an inch of short bristles sticking out around the end of the brush. This swab is also excellent to apply the acid with, but after using in the acid it should be kept in the fluid to prevent the acid action from ruining it.

There are many good soldering fluxes on the market, which can be used to advantage.

We will discuss principally the use of the soldering torch, though a pair of heavy and light soldering coppers, with a fire-pot to heat them, should be included in the equipment.

There are many effective soldering torches on the market. We are partial to a gasolene torch, which is instantly changed from a brush flame to a needle-point flame the size of a match. It is very economical to operate, burning gas made by filtering compressed air through a supply of gasolene. It has a wide range of heat, which makes it possible to do any of the many different radiator jobs, as well as numerous other soldering jobs.

Wire solder is essential to obtain the best results in torch work. In many instances, self-fluxing solder is still more effective.

Cleaning the work is the most important part of the job. Too much emphasis cannot be placed on this operation. All surfaces must be absolutely clean and bright in order to do a lasting job. Always clean a larger place than that which is to be soldered. Three-corner files with the ends in curves, right angles, hoe shapes, points, and such, are the best tools for cleaning many of the difficult places.

Brighten copper and brass surfaces by applying acid with a metal brush. If the sur-

face cleans slowly, rub it briskly with a wire brush, applying acid at the same time. Dip the brush into the fluid after this usage to prevent the acid ruining it. Stubborn places may also be brightened with emery cloth, or by scraping with a knife. Another way is to heat the surface with the torch and apply acid while it is hot.

Care should be taken not to breathe the fumes. Raw acid applied to a tinned surface darkens it, and the surface must be heated and the fluid applied with a brush. When the parts to be soldered are clean, the best results are obtained by tinning the surfaces. Play the torch flame over the metal, apply the fluid, heat again and apply wire solder.

Should the solder not flow evenly, it can be scratched into place with the curved file tool. Places which do not tin readily will usually yield to the fluid brush when it is dabbed into the heated metal and solder. Steel and iron surfaces which have lost their coating of tin must be brightened by filing or holding on the emery

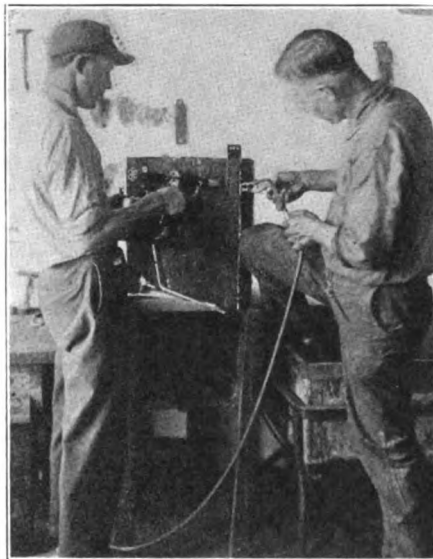


Fig. 4—Helper Plays Two Flames Along Tube to be Removed.

wheel, after which they may be tinned in the manner which has been described.

Place the radiator on the workbench, and plug the hose connections and filler neck. This can be done with rubber plugs made for the purpose, or with a short piece of radiator hose of the proper size clamped around the hose connection with a round piece of sheet metal clamped in the other end.

After using, this hose, with the clamps attached, can be kept handy in a box. Thus, it will be but a minute's work to select the proper one for the next job.

Introduce the air pressure through a rubber tube slipped over the end of the overflow pipe. Place the radiator in the tank and cover it with water, Fig. 2. Turn on the air, and wherever there is a leak, it will send up a barrage of bubbles. Mark the leaks and repair them.

The finished job should hold a pressure of from five to seven pounds. Where pres-

sure is used from a heavy pressure tank, a pressure gage, placed in the air-line between the turn-on cock and the rubber tube to the overflow pipe, will help gage the amount of air being compressed in the radiator.

Another way is to leave one hose connection open, and hold one hand over it during the test, allowing the surplus air to escape past the hand. Care must be taken not to burst the tanks.

Cracks and holes in the tanks should be patched. Clean a place about the crack or hole. Cut and tin a patch of sheet copper or brass, a little heavier than the metal to be patched, and from one-half to one inch larger all around than the place to be repaired. Tin the place to be patched. Apply the patch, holding it in place with a file, and apply the torch or copper, adding enough solder to make a strong joint.

When a seam springs a leak, brush it as clean as possible, apply the acid, and brush again. If practical, apply the torch to the seam, at the same time inserting a putty-knife blade into the leak and working it back and forth to clean away all dirt—and the abominable anti-leak, if any is present.

Apply the acid, and brush again, forcing the wires into the seam. An occasional dash of water is necessary on the dirtiest jobs. When the seams are clean, apply the fluid, following with the torch and solder.

Vibration sometimes shakes the overflow pipe loose. When possible, it is well to remove the overflow pipe, clean the place where it is to be soldered again, and tin it. Clean and tin a place about the hole, replace the pipe, and run a heavy shoulder of solder about it.

Loosened hose connections which have

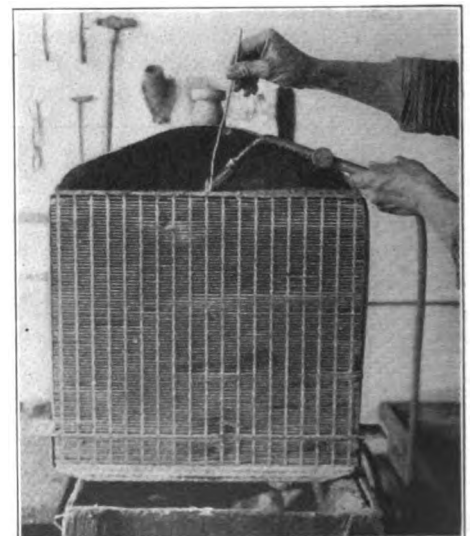


Fig. 5—Shoulder of Solder About Each Tube. lost their coat of tin must be removed from the radiator. Cut off the four or more rivets which hold the iron connections—brass connections may be re-tinned without removing—close to the connection, with a sharp chisel.

Heat them with the torch, and drive

them back with a pin punch. Flow the solder, which still holds the connection fast. Remove the connection, and brush all solder from it and from the place where it was soldered on.

Apply acid to the darkened places on the tank, and brighten the connection with a file or by holding it on the emery wheel. Tin both surfaces, replace the connection, and solder it fast. Be sure the solder flows well between the connection and the tank. Flow the rivet holes full of solder. If this job is properly done, it will last better than the first, when both solder and rivets were used.

When lower tanks crack about the stud bolts and seem a hopeless case, remove the tank and solder a false bottom inside—a quarter-inch or more above the old one. This is sometimes better than a new lower tank.

To repair broken side-pieces, tank supports, and cross-pieces on Ford radiators, take an old tank support—or a new one if you can get it—for a pattern.

Cut 7-inch pieces from $2\frac{1}{4}$ -inch by one-eighth-inch strap iron, and dub the corners on one end. Drill a half-inch hole, one-half inch from the center of each end. Clamp $1\frac{1}{2}$ inches of the square end in the vise and bend almost at right angles, like the pattern.

Place the radiator in the shell and put it, top down, on the bench, Fig. 3. This should hold the radiator and shell in their natural positions, while the support is formed to the bottom of the tank. With the support held on the shell, judge where to bend it so that it will hold the radiator in the proper position when it is soldered into place.

Make the bands in the vise, and make the support fit well. Brighten the support where it fits the tank; also the tank. Tin each, and solder the support into place. We have never had one of these come loose. The accessory honeycomb radiator will not spring leaks in the corners of the core so readily when fixed this way.

The tubular-type radiators are easily damaged by freezing. When more than a dozen tubes are bursted by freezing, it is a waste of time to try to repair them. There are numerous makes of honeycomb cores that can be installed in place of them, at a much lower cost than a new radiator—at a good profit to the repairman and giving as great an amount of service to the customer as a new radiator.

Suppose your customer is determined to have his old radiator repaired, and you stop the leaks in a large number of tubes. It is a safe bet that there are many times as many tubes bulged as were leaking, and it will take only a light freeze to burst them.

Your customer will return, tearing his hair and swearing that he never froze the radiator—that you made it worse than ever. Again, he may feel that he has had enough experience with you and go elsewhere and buy a new radiator.

Explain carefully to your customer the

sins of the tubular radiator. Tell him what to expect if he does not use a good anti-freeze solution in cold weather. Then, when he does freeze the radiator, he will remember what you said, and return to take your advice or follow your suggestions.

A tube that is bulged—even slightly—will freeze and burst when one scarcely realizes it is freezing. This is another disadvantage in splicing tubes, or in soldering the leak where the tube is bulged. Even though the tube is re-sized it is sure to have an uneven diameter, and these are the tubes that burst again.

Another disadvantage in repairing bursted tubes is in having to tear out the fins—even though a false fin has been put on the market, with which a radiator that has had the fins torn out can be disguised so it will escape notice a few feet away.

A better way, where only a few tubes are leaking, is to explain the situation to your customer, explain your method of repairing, and proceed to cut the offending tubes out of the circulation. This can be done without damaging the appearance of the radiator.

Locate the leaking tubes by inserting a screwdriver between the fins where the bubbles come up. If your light is good the tube is easily located. Spread the fins a little—an inch or less from each tank—over the leaky tube, and drive a sharp instrument into it. Gradually work the hole until it is nearly as large as the diameter of the tube, and repeat at the other end.

Apply acid with a small swab, heat the tube in the hole and apply more acid. Heat again and apply fluid, followed with solder. Care must be taken to see that the solder flows and tins the inside of the tube evenly. Then fill the hole with solder—self-fluxing solder is desirable for this kind of a job. A few tubes cut out of the circulation in this way will not materially injure the cooling system, and will prevent the same tubes from freezing again.

Someone may raise the question of installing new tubes. This may be all right sometimes, but a radiator with a number of bulged tubes—even though they do not leak—will not justify the expense of installing new ones in place of those that do leak.

To install new tubes, remove the bottom tank, cut the tube off close to the upper tank with a tapered hacksaw blade. Get a helper and two blowtorches. Stand the radiator on edge, Fig. 4, and have the helper play the two flames along the tube which is to be removed until the solder holding the fins to the tube begins to flow. At the same time play the soldering torch flame to the tube where it is soldered into the tube sheet.

Continuing this, grasp the tube with a pair of pliers and pull, twisting it gently about. After it starts it will come all the way. Have all the tubes which are to be removed ready and draw them all, one after another.

Never remove tubes from end rows, as the fins will grip the tubes in removal and

prevent the new tubes from entering the holes. Plug these tubes. Press the fins back from the upper tank with a screwdriver, loosening the short piece of tube with the needle flame. Remove it with a pair of long-nose pliers.

A better method, where you can use it, is to open the upper tank. On Ford radiators, the front section of the upper tank can be quickly removed with the torch by running the solder from the seams holding it in place. Play the torch flame on the tube inside the tank removing all ends.

New tubes are easily inserted, as a rule, but, in case of difficulty, run a quarter-inch drill with a long shank welded to it through the hole, and the tube will go.

A help in stiffening the tubes while inserting them is a steel rod that will just go inside of the new tube. Solder a collar near the end of this rod, and it will insert tubes as fast as you care to operate it. After the tubes are all in place, solder them to the tube sheets, replace the tanks, and test for further leaks.

A common fault of the 1917 type Ford radiator is that the vibration shakes the tubes loose in the upper tube sheet. Always remove the front section of the tank to repair this, Fig. 5.

Apply acid to the entire tube sheet and to the ends of the tubes. Put on plenty and let it stand from a few minutes to several hours, according to the speed with which it cleans. Several applications of acid may be necessary during this time.

When ready to work, brush around the tubes well and wash the acid off. Dry the tube sheet with the torch and apply the fluid. Hold the flame on a tube and its seat until it is hot, dab it with the fluid brush, heat again, and apply wire solder. If the tube end and its seat are cleaned properly, the solder will flow evenly all around the tube and seat, making a better joint than the original.

When the solder does not flow evenly about the tube, the curved file tool will usually remove the obstruction. If it does not, a dash of acid to the heated tube and seat may be necessary, after which the solder will usually stick. Here again the self-fluxing solder is more effective.

In this job it is always best to solder in the complete tube sheet—that is, solder each tube in the entire sheet. If you do a good job, it will never have to be done again. The lower tube sheet can be treated the same way by removing the lower tank.

Sometimes a tube will break off just above the tank. To repair, clean the tube well where the break occurs, bend a narrow strip of sheet metal around the break, and run solder into it.

When side-pieces and tank supports have broken loose, melt the solder that still adheres and brush it away. Brighten dark places, tin, and resolder piece into place.

Take care of all solder scraps and chunks brushed off. They can be melted, the dirt removed, and slim bars molded from it.

(To Be Continued.)

Installing Bosch System on the Ford

Outlining Method of Installation of the Bosch High Tension Magneto for Ignition and Discontinuing the Use of Coils on the Dash and the Timer and Wire Assembly—Magneto May Be Used for Lighting Purposes Only

By J. N. Bagley

Many users of Ford cars prefer to install the Bosch high tension magneto for ignition, discontinuing the use of the coils on the dash and the timer and wire assembly. For the benefit of those who care to make this change, the following information is given:

For some time the Bosch magneto company has provided a special ignition outfit for Ford cars, both chain and gear-driven. However, the gear-driven equipment seems to be the one most favored. This outfit can be attached in a very short time by any garage mechanic at a nominal cost for installation, as no special tools are required other than those used in the general repair business.

When this outfit is installed, nothing could be wished for that would give a better or more evenly running engine. Synchronism is as nearly perfect as it is possible to obtain with any type of ignition outfit. The following manner of installation is approved by the Bosch company, although the matter may be condensed or changed a trifle from the regular data furnished by it:

To begin with, it will be necessary to remove the hood and drain the water from the cooling system. The coil box should be removed from the dash, as there will be no further use for it. Remove all the wires from the back side of the dash and loosen the coil box proper by removing the four nuts from the studs that extend through which, in turn, are a part of the bracket to which the coil box is made fast with screws.

When the coil box is removed, a nut will be noticed behind it which should be removed, as this will permit of the rod running under the hood being removed with the radiator. Disconnect the priming wire

from the carburetor and remove the two cap-screws holding the top water casting to the engine, as shown at A, Fig. 1. As soon as the nuts holding the radiator in position on the frame are taken off, it may be removed and set aside while the work is being done. Next, remove the fan assembly from the front of the engine.

Now that the fan assembly is out of the way, the next step will be to remove the timer rod running from the lower end of the steering gear to the timer and which is used for advancing and retarding the position of the spark. To remove the timer, loosen the cap-screw holding the spring against the face of the timer shell.

On the end of the camshaft will be noticed the nut which holds the roller or brush in position. Remove the nut, also the cupped washer which covers a small pin passing through one side of the roller or brush body and prevents it from turning out of position as the locking nut is tightened. After this last mentioned assembly is removed, the front end of the engine is clear.

It will be necessary to remove the fan pulley, as a new pulley will be supplied that does not interfere with the equipment. To remove the pulley, first turn the starting crank over and drive the pin out through the hole in the neck of the crankcase, after which the ratchet may be removed from the starting crank and the crank removed.

Next, remove the cotter-pins in each end of the pin inside the inner flange of the pulley and drive the pin out, after which the fan pulley may be removed from the

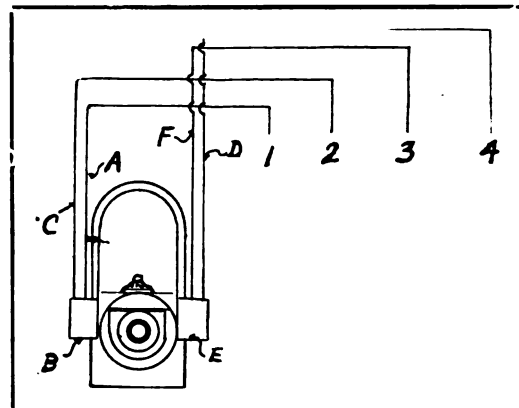


Fig. 2—Note That Firing Order of Ford Engine Is 1, 2, 4, 3.

end of the crankshaft by placing two screwdrivers between it and the front of the engine.

In some cases the old pin will project through the new pulley far enough to interfere with the fan belt. It will then be necessary to file a little from the two ends before placing the cotter-pins.

The key for the large Bosch gear is to be set in place on the camshaft after first enlarging the hole in the end of the shaft by running a 5/32-inch drill through it. Sometimes the drill will leave a burr which should be removed with either a file or scraper—preferably with a file.

The second and third bolts holding the lower crankcase on the valve side of the engine are to be removed as well as the cylinder front-cover bolt immediately to the right of the camshaft. The three bolts—two vertical and one horizontal—at the base of the cylinder front-cover and to the left of the starting crank, are to be removed and the heads reduced about one-half, so that they will not interfere with the placing of the gear housing of the Bosch system.

It will be necessary to cut an opening, about two inches by three inches, in the engine pan, to provide sufficient clearance for the Bosch gear housing. The exact location and size of the opening in each particular instance is determined by applying the housing loosely to the engine. First, however, attach the magneto supporting bracket to the housing, using for temporary purposes the two hexagon-headed cap-screws and washers which are a part of the equipment.

The correct position of the four bolts securing the magneto to its supporting bracket is to be marked off on the engine pan, and a hole about one inch square cut at

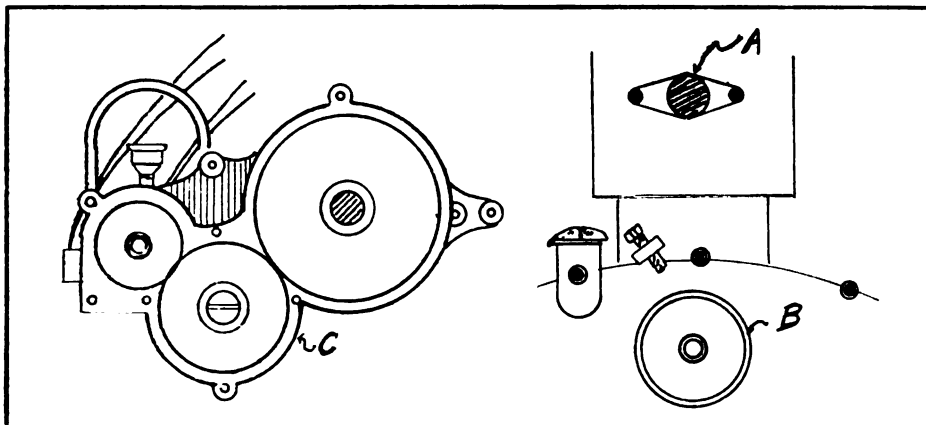


Fig. 1—Slip Large Gear Into Position, Being Careful That No. 1 Cylinder Is in the Correct Dead Center Position.

each point so that it will be possible to remove the magneto any time after the complete installation by disconnecting the coupling and removing the four bolts mentioned.

The cutting of the four holes can be done very nicely with a sharp chisel by placing a bar of lead on the end of the jack and forcing it up against the engine pan. In case the bar of lead is not at hand, a block may be sawed from the end of a small log and placed on the jack with the grain of the wood perpendicular to prevent the spongy effect of the wood from interfering with the cutting.

If the details already mentioned are carried out, the gear housing and magneto bracket will readily drop into the correct position without any trouble whatever, and the screws holding both in position will go into place very easily.

The magneto end of the coupling is to be secured to the magneto shaft by means of the nut, washer and Woodruff key accompanying the equipment. The magneto should now be secured to its supporting bracket by the bolts or cap-screws included for the purpose, placing a suitable locking washer on each to prevent their working loose because of vibration. The magneto end of the coupling is to be connected to the bolt end of the coupling by means of the four slotted hexagon-headed bolts and the center coupling, be it leather or metal.

The object of this coupling is to make a flexible joint between the driving-shaft and the magneto, eliminating the chance of the bearings of the magneto being damaged by being slightly out of line, which would be the case if the flexible coupling was omitted. Therefore, in assembling the coupling, it should be remembered that the leather center-piece is intended to allow for any irregularity in alignment.

In order to secure the flexible drive effect, however, the two flanges of the coupling ends must be bolted directly to the leather center of the coupling. The flanged ends must be set crosswise, one to the other, using all four of the bolts provided for the purpose. Under no circumstances should the flanges of the two couplings be bolted directly together—that is, bolting them straight through and using only two of the four bolts—as this would destroy the flexible joint provided for.

At this time the Bosch gear-housing cover and large gear are removed, and the entire attachment mounted on the engine in the position provided for in removing the parts already mentioned. It should now be held loosely by the four supporting bolts previously mentioned.

It is possible that the slight inequalities in the castings of the engine may at times interfere with the proper alignment of the outfit, so that special care should be exercised that both of the lugs of the magneto bracket bear on the crankcase and that the two holes in the bracket lugs register with those in the crankcase flange, where it is intended to rest.

Should any irregularities exist, they may be readily corrected by slightly filing the face of the oil-cup casting, which is a part of the engine. The shoulder of the gear-housing can be filed if preferred, or washers may be placed under the lugs of the magneto bracket. However, any one of the three suggested operations will correct the trouble very nicely.

The cover over the magneto armature, known as the dust cover, also the brush holder farthest from the engine, are now to be removed and the piston of No. 1 cylinder nearest the radiator brought on the top dead center of the compression stroke and held in that position.

The magneto coupling should now be turned by hand, by means of its coupling, in the direction in which it is driven until, first, the metal slipping segment is visible in the slipping groove corresponding to the figure 1 of the brush holder which has been removed and, second, the trailing end of the armature is about 9/16-inch from the pole shoe on the right side of the magneto, when viewed from the shaft end.

Now, as we hold the armature in this position, the large gear shown in Fig. 1, is to be slipped into position on the camshaft and meshed with the idler gear, care being taken to see that the position of the No. 1 cylinder has not been accidentally moved from the dead center position where it was previously set.

We might mention that it is very important that the gears do not mesh too tightly

housing shifted slightly to the left, or until the proper amount of clearance is obtained. It will be noticed that the two holes in the housing are left a trifle large for this purpose. In a like manner, the housing may be shifted in the opposite direction if necessary.

In case the adjustment of the gears is correct, the two gear-housing supporting bolts as well as the two bolts securing the magneto bracket to the crankcase, are to be made permanently tight, using for the two bracket bolts the original Ford nuts and new lock washers.

It will also be noted that the original nut and washer are used on the end of the camshaft to retain the position of the large Bosch gear. Care should be taken in setting up all the nuts and bolts to see that they are tight, for once a little slack creeps in it is but a short time until the entire assembly is entirely out of adjustment and the casting and bolts worn until it is a difficult matter to keep it tight.

At this time the gear-housing should be packed with a good quality of grease that will not soften under the low heat. The paper gasket should now be fitted into place and the gear-case cover securely fastened in place. Every day the car is used the grease cup on the housing should be given a turn or two and should be refilled when empty.

We are now ready to replace the slipping brush holder and the cover used to prevent the dust from reaching the armature end of the shaft. We are now ready to place the wires in the position illustrated in Fig. 2. Beginning with the cable marked A, we pass it to cylinder No. 1. The cable marked C, coming from the same brush holder, passes to cylinder No. 2. The cable marked D, in the brush holder E, passes to cylinder No. 4, while the cable marked F, coming from brush holder E, passes to cylinder No. 3. Therefore, it will be noticed that the firing order of the Ford engine is 1, 2, 4, 3.

The best plan to pursue will be to lead all cables under the arch of the magneto and through the cable guides supported by the bracket, the latter being secured to the engine by means of the center cylinder-head cap-screw on the magneto side. After connecting the short connecting-rod with the arm of the interrupter housing and securing it in place by means of the washer and cotter-pin, the advance bracket is to be set across the first two studs holding the inlet and exhaust-pipe clamps and is secured to the clamps with the nuts already used for holding the clamps or, in other words, the original nuts.

It may be necessary, in some instances, to file the shoulders of the clamps slightly to permit of the nuts having sufficient threaded surface on the stud to hold well, as the lengths of the studs vary on the different engines just enough to make filing necessary. The long connecting-rod passing across the front of the engine is to be en-

(Concluded on page 32.)

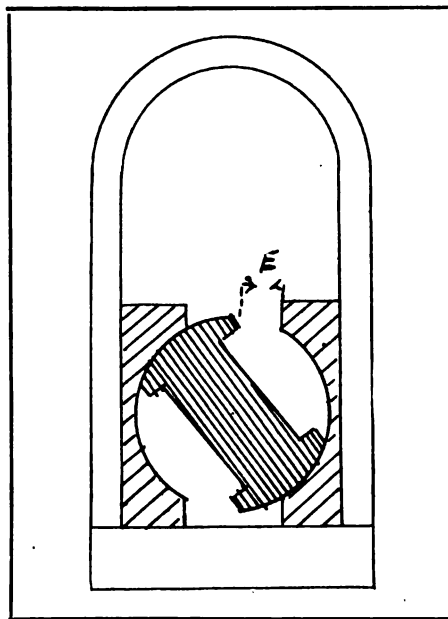


Fig. 3—Measure 9/16-Inch Distance Carefully.

and, after tightening both bolts supporting the housing, it should be seen to that the play between the driver gear and the idler gear is the same as that between the driven and the idle gear or a noisy set of gears will be the result.

Should the large gear mesh too tightly, the two bolts supporting the gear housing should again be loosened and the entire

Glimpses in the Garageman's World

"Money Invested in Well-Equipped Service Car Will Pay Mighty Good Dividends," Says One Garageman—Old River Front Warehouse Building "With a History" Makes Excellent Garage Quarters and Does Flourishing Business

Service Car Brings Business.

When asked how he had managed to build up such a good business so quickly, a certain garage owner pointed to his service car and smiled.

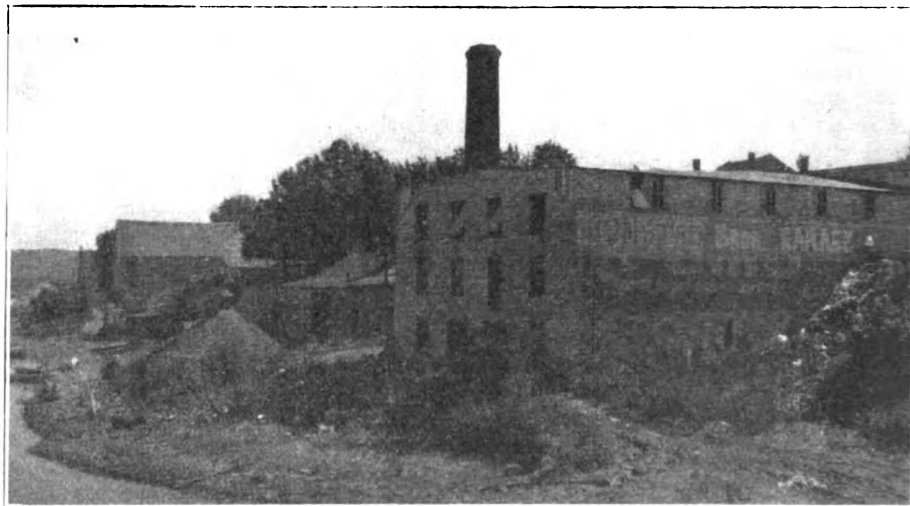
"That," he said, "in a way, is responsible for my good business. Every car owner for miles around knows that I have this service car and knows that it carries everything from spark-plugs to air. When in trouble, their first thoughts are of the service I am prepared to render on a few moments' notice. The result is that I generally get a call.

"Early in the game, I learned that when a motorist called a mechanic, he expected to be 'held up.' I have made it my motto to never take advantage of a man in trouble. It is not my policy to 'knock' other shops, but I have made the charges for the service car so light that a man acquainted with the service will call the service car before he will even repair a puncture himself or run in on the rim.

"The service car has brought me in contact with a great number of people I would never have met without it. Courteous treatment and reasonable charges have made many of them regular customers. This proves to me that money invested in a well-equipped service car will pay mighty good dividends to any garage owner."

Advantages An Old Building May Have.

Ordinarily, the most satisfactory garage is the one which is built from the ground up—but, for the prospective garageman and automotive dealer with a seeing eye, there is frequently a building somewhere in town which is located just right and so built that it can be made into excellent garage



Steamers Used to Land at Its Doors—Now It's a Busy Garage.

quarters at far less expense than erecting a new building.

An interesting example is the garage of Hunstad Bros. at Guttenberg, Iowa. Guttenberg is on the Mississippi river and, in the days of big steamboating on the upper "Father of Waters," was an important shipping point.

There were a number of steamboat lines in operation on the northern river, and all of them built large warehouses on the river shore. In high water the steamers used to land at the doors of these warehouses and unload and take on cargo. In low water the goods were transferred on runways between the warehouse and the steamers.

The largest of these warehouses on the Guttenberg river front was the one belonging to Joseph Reynolds. It was built

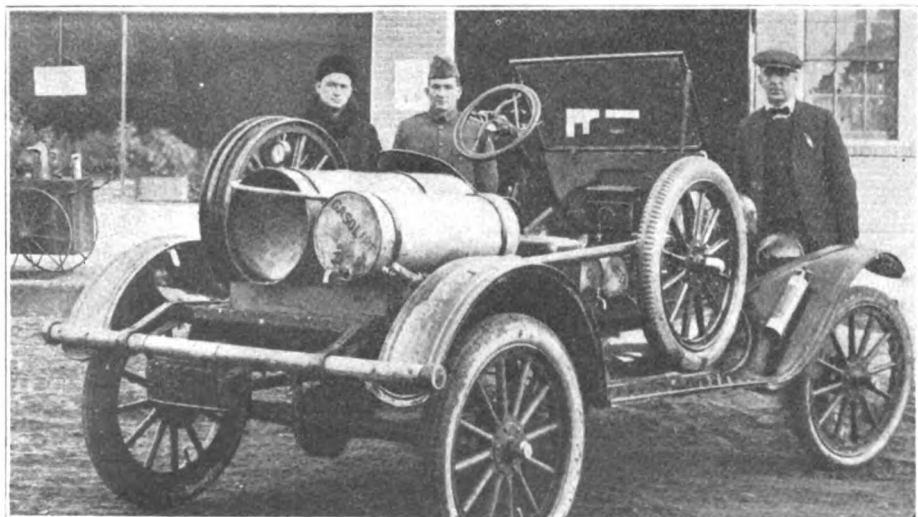
of rock with immense walls, staunch enough to last a hundred years or more. With the decline of steamboating, the fine building was abandoned and for many years stood empty on the river shore.

Meantime, motoring came into being and the main highway for business and tourist traffic passed by the front doors of this warehouse. Just as the warehouse was best located for boat business, it was now admirably located for automobile business. At least that is what the Hunstad Bros. decided when they opened up a garage in it, getting possession of the building "for a song."

Now the front doors are just as busy receiving and dismissing automobiles as the rear doors used to be with the boats. The thick rock walls make it warm in winter and cool for summer—a condition not found in most modern garage buildings, for walls two feet thick have gone out of date.

There is another thing about this garage. You should see how motor tourists prick up their ears and ask questions when they learn that steamers used to land at the doors. They do not forget the place or the story—and they tell their friends about it, which the Hunstads have found brings business. The motor tourist is keen for sights and experiences out of the ordinary. An historic garage appeals to his imagination.

Maybe there are other well-preserved ancient buildings which are as favorably located for service stations as they were for the accommodation of folks in the early days, and maybe there are dealers who might be able to pick them up for "a song" and profit by the transaction.



Carries Everything From Spark-Plugs to Air—It Is Prepared For Any Call.

Garage in Heart of City.

For years San Francisco has needed one thing badly. That is a modern, up-to-date garage service in the heart of the wholesale and business section, where patrons from the leading hotels, theaters, banks and shopping district can park their machines, or have them put into proper condition by expert workers.

Recently several well-known automobile men who are familiar with every angle of the game, were impressed with this imperative need and determined to open up a garage service that would be worthy of San Francisco's predominance in the automobile industry on the Pacific Coast.

By sheer good luck they were able to secure probably the best location in the whole downtown district. They obtained a lease on a lot at 151 Stevenson street, just opposite the main entrance of the New Montgomery street entrance to the Palace hotel.

Here, in this choice location, because most convenient for both city and country visitors, the Palace Garage was recently opened.

The garage is constructed of steel and concrete and is absolutely fireproof. It is of four stories, with a basement and roof, making six usable floors in all. There is not a particle of wood used in the structure except for the office.

One of the first features of the garage that attracts attention is the wide, spacious entrances. They are too large to be called doorways and, in entering or leaving the garage, there is plenty of room to turn, so that there is absolutely no chance of blockade or delays and no danger of knocking, scraping or butting into other cars.

The main floor of the garage is devoted to offices at one end, while the main body of the floor is used for car inspection and temporary parking. On the south side are double washers, where the help can wash or grease two automobiles at once.

Connecting up the various floors, from basement to roof, is one of the largest service elevators in the West. It is 21 feet long and can take up the largest automobile built as easily as a child can lift a pin. There is not the slightest vibration in the process. Attached to the elevator is a signal service which notifies the operator where he is wanted.

At the east end of the main floor is a chauffeurs' room, equipped with washroom and showers for the use of drivers who have become tired out or dusty by long journeys.

Above these quarters, on the mezzanine floor, is a handsome dressing room for women patrons, where are installed all the conveniences usually found in such places.

The three upper floors are to be used principally for parking purposes.

An ingenious telephone system permits the help to communicate with one another quickly, and contributes greatly to effi-

ciency. Owing to this improved communication system, few garages in the city can serve their patrons more expeditiously than can the Palace Garage.

It has a capacity of about 300 automobiles a day, which makes it one of the largest in San Francisco. It has exceptional accommodations for cleaning and greasing automobiles which are out of condition. The double washers on the first floor are duplicated on the roof floor, which makes it possible for the help to handle four cars at one time.

Washing and greasing an automobile seems to be an easy and simple thing. Yet to do this well requires a skill and efficiency which are possessed only by the most experienced automobile helpers.

The Palace Garage has men employed who omit nothing to make such a job thorough and complete. "The Palace Way" is already a title earned by the helpers through their wonderful efficiency. The fame of "The Palace Way" of putting a machine in good order and making it look like new is spreading throughout the city and will be a guarantee of future business for this enterprising firm.

A novel feature of this garage is the fact that provision has been made for adding two additional stories at some future time. The illustration of the roof shows how this provision has been made, the columns being extended up through the roof about 30 inches.

Give Attention to Lubricating Oil Sales

Development of some business in the sale of lubricating oil can make a nice accession to the profits of a garage or car sales company.

The Mason-Kraepelin Motor Co., White-water, Wis., the business of which is principally that of a Ford garage but which also sells Fordson tractors has, since the beginning of the year, been giving considerable attention to utilizing the opportunity to sell lubricating oil and cashing in on it.

This company has always sold this class of oil, but in the early part of this year it specially considered the matter, put in a strong line of car and tractor oil, and then made a point of talking oil to its customers. It has now doubled its oil business of a year ago.

This is what the company says about its method: "In the first place, we made sure that we were thoroughly sold ourselves on the line of oil we are handling. We did very little advertising but explained to our customers what this oil will do for them in their lubrication.

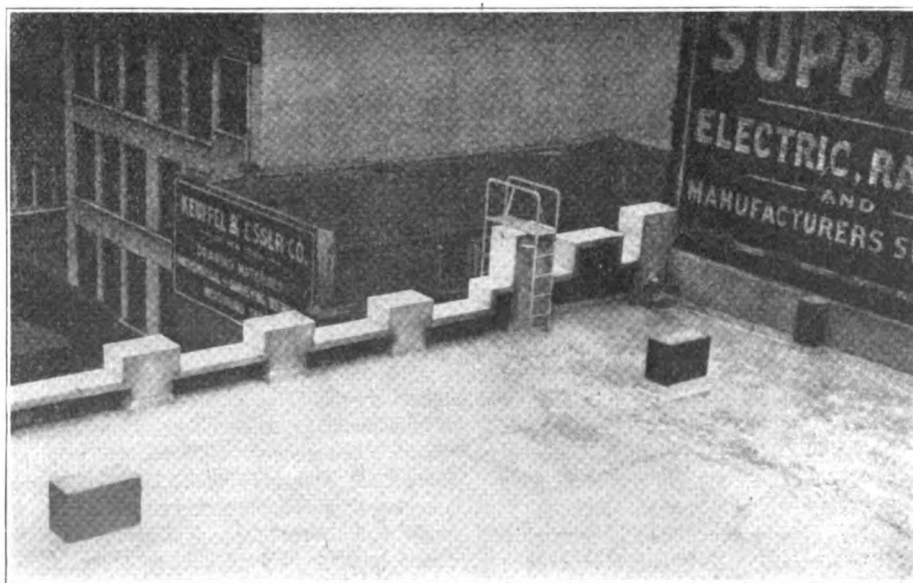
"We made it clear to them how they would be ahead by using this oil compared to some cheap oil, persuaded them to give our new oil a trial and then left it to them whether they wanted this good oil or some other. Since we did this, our customers have in no case called for cheap oil. All we want is a trial for our oil. After that, it advertises itself by the service it gives.

During a tractor demonstration we gave away half a barrel of the oil for trial. The man we gave it to liked it so well he spread the word and has developed many customers for us.

"While we don't do much advertising, we take advantage of the good advertising literature the manufacturer of the oil provides and we mail this to a list of names we have. Our plan in developing our oil sales is to build up a good repeat business."

The company sells about half its oil in quantity in cans and the other half in small lots at the curb at a higher price. The tractor oil is sold in the country by the tractor salesman. In fact, about half their oil business is in the country. They are selling about six barrels of lubricating oil per month. They also deliver oil.

With the great number of automobile and tractor owners there are now, there is an opportunity to do some oil business for all those who will give it some attention.



Palace Garage Has Made Provision for Future Expansion—Note Novel Roof Construction.

Welding, Cutting and Brazing Practice

A Discussion as to the Type of Acetylene Generator Which Is Best Suited for Garage Use — Methods of Generating Acetylene Gas — Precautions Which Should Be Observed by the Welder When Operating Acetylene Tank

By David Baxter

There are three general sizes of acetylene generators manufactured for use in connection with the welding torch, but it is scarcely necessary to give a detailed description of more than one type in this discussion. This is the size which is used principally in garages, or rather the size which will best handle automobile repair work. This style could very well be called the medium or semi-portable generator.

Another size is the large stationary plant, used mostly where a considerable number of operators are employed or where a large volume of acetylene gas is consumed.

In the third group is the small portable outfit. The portable-tank outfit has replaced this to such an extent that few really portable generators are now used.

Therefore, when we refer to generators in this article, the medium size is meant unless another is specified.

It might be well to explain that there are three general methods of generating acetylene gas: First, where water is brought into contact with carbide—the water-to-carbide process. Second, where the carbide is dipped in water—the dipping process. And, lastly, what is known as the carbide-to-water method. This is the one we shall discuss, since its use is almost universal. The other two methods are but little used in this country.

Chemically, the production of acetylene is one of the simplest reactions. In shop practice it is not always so simple. There are two chief difficulties in the way of the correct production of the gas. These are heating and excess production or after-generation as it is called.

The first, in a few words, means that the hydrogen and oxygen of which water consists separate with the absorption of heat. Then, when the oxygen is free, it combines with carbide to produce more heat than the reaction absorbs. This heating is overcome in the generator by supplying more water than the mass of carbide can heat. Lime is a poor conductor of heat, so that if there is not plenty of fresh water, the mass can become red-hot.

Heated acetylene gas is poor—in fact, not good for welding purposes, principally because of its impurity. It is filled with tar substances and other solids which are detrimental to the quality. Therefore, the welder should continually guard against overheating. One way of detecting overheating is by the sulphurous odors.

As for after-generation, if a machine could be devised which would stop producing gas abruptly with the stoppage in consumption, we would not be troubled

with this defect—but the gas generation must take place until the water has soaked to the heart of each and every piece of carbide that is dumped into the water.

However, the after-generation need not bother much since modern apparatus goes considerably beyond the danger line by supplying plenty of water. Unless entirely too much carbide is fed into it, its operation will not become hazardous. The welder has only to follow instructions in regard to supplying fresh water and keeping the generator tanks absolutely clean.

If the operator uses his plant according to the manufacturer's rules, it should last about ten years before overhauling is necessary.

Impurities in acetylene gas—even in very small quantities—can impair the strength

fact that the flame is off color and is exceedingly hard to regulate.

We have touched upon the technical side of acetylene generation just enough to let the welder see why he should follow the instructions of the manufacturer of his plant. We shall dip deeper into less scientific data, as we go along, for other reasons for obeying these orders.

When purchasing a generator and installing it, the purchaser should place the whole apparatus in a separate room or shed, if it is possible. If this can not be done, then a high partition should be built around it to prevent sparks or bits of flying metal from reaching it. This is just a common precaution, because we can never tell how far a flying spark will travel, nor when it will land on a leaky valve.

This shed should be well-ventilated and arranged so that the air will pass through and dissipate any tendency of the gas to collect in quantities thick enough to ignite.

Then, there should be plenty of light around the tanks so the operator—or some one in charge—can inspect the apparatus at frequent intervals, for it should be remembered that chemicals corrode the metal, especially in corners and around pipe connections.

The inspector should be able to see this in time to prevent accident by scraping off the rust or corrosion. It should be light enough in the room to permit him to see the gages and to examine the automatic devices from time to time to note their wear.

An apparatus crowded into a small space invites neglect. If the mechanic does not have room to work without bumping his head or skinning his elbows, he is bound to slight the machine.

The generator room should be separate from the balance of the establishment if possible. If an explosion does occur, there is then little danger of anyone getting hurt. The separate arrangement modifies the insurance premium considerably as usually there is no extra charge. The generator should never be placed in a cellar or basement or other badly ventilated place.

Cleanliness is another feature which the careful man will watch. He will not permit the piling of trash or junk in the generator room, and he will prepare a handy, clean arrangement for taking care of the carbide residuum. The white sludge or waste from a generator makes an unsightly mess if allowed to run over the yard. If the waste can not be fed to a natural drain, a pit or tank should be placed to catch it.

This should be such that the solid part

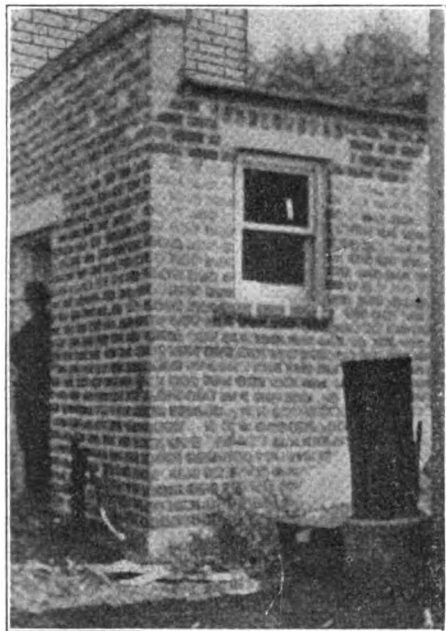


"A Pit or Catch Basin Should Be Provided to Catch the Carbide Residuum."

of the welds considerably. Metallurgists endeavor to remove phosphorus and sulphur from their iron and steel. We find these two enemies in impure acetylene, which, if used, will inject these objectionable elements into the weld. The weld should be particularly free of them if it is to be perfect. Their presence is detected by the

can settle to the bottom, where it can be dipped out and hauled away. Even when the drain is attached to a sewer, the catch basin is necessary, because the refuse will soon clog up the pipes if it is not dipped out.

A handy arrangement consists of a concrete box about six feet long by two feet



"The Generator Room Should Be Separate from the Welding Room."

wide and three feet deep, with a cover to prevent anyone from falling into it. The generator tank drains directly into this box, where the carbide settles and the water flows out near the top.

The sludge is not exactly waste for it has some market value. It forms a convenient—probably the best—whitewash. It is good for any ordinary whitewashing purposes—such as barns, hen-houses and workshops. It is as good, if not better, than lime whitewash, for fruit and shade trees as it will stay on the trees longer.

It is very essential for the welder, and at least one other person, to be perfectly acquainted with the working and construction of the generator apparatus. They should obtain full instructions for the manipulation of the plant from the manufacturers. No one but the person who understands its workings should be allowed to fill and regulate the generator. Loafers, and others who always see with their fingers, should be kept away from it.

Whoever operates the generator should not smoke in its vicinity, as even a lighted cigar or cigarette may ignite an unknown leak. In fact, the cleaning and charging of the plant should always be accomplished in the daytime. Then there will be no temptation to strike a match or go about the tanks with a lantern.

Buckets, baskets, etc., used in charging the generator should always be cleaned with a strong flow of water and allowed to dry before using.

In loading or charging, where it is not

possible to empty the carbide cans directly into the hopper, they should be emptied into a dry bucket and then poured into the hopper. The carbide should not be poured on the floor and shoveled in, because there is always more or less waste to this method.

Another instance where some welders commit willful waste is in leaving a handful or so of the carbide in the can. The flanged mouth of the can prevents the carbide from falling out easily and they do not take time to shake it all out. When only part of a can is used, the lid should be pressed tightly back into its place. If it is not, the carbide will lose its strength—the same as does lime when it slakes.

Then, too, there is some danger if the lid is not sealed. Water may fall onto the can, run inside and generate gas the same as in the generator tank. The writer has heard of a case where water entered a can and formed gas which exploded when the can was brought into the shop and placed near the preheater.

The cleaning of the generator tanks is probably the most important part of operating the plant. The cleaning should be done at least as often as the manufacturer prescribes. It should be cleaned thoroughly and never neglected. Neglect is probably responsible for the majority of acetylene explosions.

Cleaning includes changing the water which, in turn, means keeping the gas cool. Heated gas means impure gas, as has been mentioned. To keep down the temperature, plenty of fresh water must be supplied. Heat means not only impurities but hazard as well. The heated mass expands and finally ignites by internal combustion. An explosion usually follows.

When cleaning the tank or changing the water, always be sure to wash out all of the residue. Otherwise, it will gradually cake up in the tank and cut down the area. Then the ratio will not figure out correctly and the welder will commence to have trouble.

If the water is not changed and the residue washed out when it should be, the water becomes thickened, so that finally the carbide will not fall into the water as it should but will pile up in a cone until it gains weight enough to slide down all at once. This creates a sudden immense pressure which is not without danger. Then, too, the slaked carbide causes the water level to be raised, which crowds the gas chamber and probably results in feeding moisture to the welding flame.

Most generators nowadays have what is called an "agitator"—not a bolshevik, if it is used properly, but it might be if not manipulated according to regulations. This device stirs up the sludge so that it will pass out with the water when the tank is cleaned. It should not be handled halfheartedly while the whitewash is flowing out but turned vigorously. It is a good idea to open the drain valve by jerks, as this adds to the washing action of the

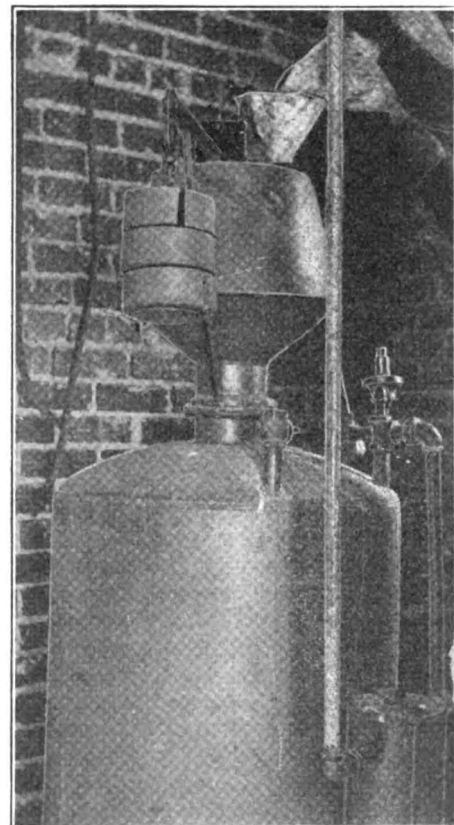
flowing water. Keep the agitator turning while the water is flowing. It is money well spent to run several gallons of water through the tank after the residue has all drained out.

When recharging, the operator should be careful about pushing around in the hopper with a rod or stick in an effort to work the carbide down faster. In some styles of generator there are several delicate mechanisms that may be damaged by the prodding.

In winter, some precautions are necessary to prevent the tanks from freezing. A steam-heating plant is no doubt the best, because it is really the only safe way to keep the plant warm. At any rate, never leave a fire in any form in the generator room. Even an electric light can not be said to be absolutely safe under all conditions.

Where a steam or hot-water system of heating is out of the question, the safest thing to do is to drain all of the water out of the tank at night in freezing weather. This takes a little time and may seem wasteful, but it is much cheaper than to allow the generator to freeze and burst.

Now, in closing this chapter, let us warn the welder, in the event of defective work-



"Generator With Automatic Hopper Feed."

ing or sudden failure of the mechanisms of the generator, to keep away from the generator with the welding flame. In fact, he should not go around at any time with the flame burning.

If repairs have to be made with the torch, the generator should first be drained, cleaned and dried. A leak may have oc-

"Standard Lighting" Ousts "Dimming"

Dealers Now Have Opportunity to Sell Better Driving Light—Illuminating Engineering Society Frames Law Equally Fair to All—Sales on Basis of Better Light and Legality Are Only Foundation for Staple Lens Business

By Robert Livingstone

With the information already given in previous articles on the construction and operation of headlights and the methods of focusing and pointing so as to get proper distribution of light on the road, and with the results of many hundreds of experiments to guide them, it is possible to understand how the Illuminating Engineering Society was able to frame a suggested headlight law that would be reasonable and enforceable.

The idea was to recommend certain specifications for road lighting that could be adopted by all of the states instead of leaving it to each state to devise its own regulations without regard for what had been done in other states. The Illuminating Engineering Society, of course, is not interested in methods of enforcing the laws or in any particular method of securing the kind of light that is recommended in its specifications.

Its only motive in taking hold of the matter at all was that in the past there had been a great deal of legislation passed without accurate knowledge of the subject of lighting, so that the laws were often little more than ridiculous.

It used to be that headlight laws were more or less the result of lobbying by lens makers who hoped to sell huge quantities of lenses to the public as soon as the laws were passed. If it happened that the lobbyists were disciples of the now illegal diffusing type of lens, there was a law calling for ground glass or other disfigurement of the surfaces of the glass in such a way as to break up the light beam and scatter it higher and wider. If the lobbyists represented manufacturers of deflecting lenses there was a law, worded so loosely that it could never be enforced, limiting the height of the beam of light.

In some cases, the two theories were combined and there was a law specifying a height limit, and at the same time insisting that the light be diffused. Lenses and laws became so confused that in one case, at least, a certain city ordinance simply said that all cars must be equipped with "patent lenses."

There was no uniformity of laws, and the laws were framed almost entirely on the assumption that "glare" was something definite that could be strained out of the light just as dirt can be filtered out of water. All the emphasis was laid on the idea of motorists doing something to protect the people they met, regardless of the hardship they imposed upon themselves at the same time.

But the Illuminating Engineering Society, knowing exactly how light affects the human eye and what is required for safe lighting of the roads, went at it from an entirely different angle. It had no particular kind of lenses to boost—in fact, didn't care whether its suggested law encouraged the use of lenses or not—so that when its law was ready to present to the various legislatures, it represented what science had determined was the best for the majority of the public.

The illuminating engineers knew that the dictionary definition of "glare"—a dazzling

An Investment That Endures.

Practical men are realizing that business is more than mere machinery and that prosperity really awaits the development and organization of human beings. It is not enough to be religious, and let the matter rest there. We shall not find truly enduring investments unless we express our religion in our business and strive to bring happiness to all those dependent upon us for their daily bread. We must strive to help others to help themselves, and give their souls expression.—Roger W. Babson.

or blinding light—was not sufficiently definite for them to work on. Glare is not a thing alone. It is rather a comparison, or a relative thing. For instance, if we were in a dark room and should strike a match suddenly, even the match with its one candlepower would blind you more than if you met a headlight throwing 20,000 candlepower in the daytime.

In the case of the practical lighting of roads and the conditions met when driving, glare can be roughly defined as the relation between the amount of light you are throwing on the road and the amount the other fellow is throwing in your eyes. In other words, no matter how much light the other fellow is throwing at you, you can always offset it by throwing a sufficient amount of light on the road from your own headlights.

This does not necessarily mean that your light shall bother other people, because your light on the road is not made less effective by keeping it below the level of your headlights so that it can not shine up into other people's eyes.

Consequently, the standard law requires two definite things: First, that the motorist must have at least a certain minimum of

driving light. Second, that he must not throw more than a certain amount of light above the level of his headlights. The more light there is below the level of the headlights and the less there is above them, the better for everybody.

The laws state very plainly that the motorist who does not have sufficient light on the road to enable him to see where he is going, is as much of a menace as the man who lets his headlights "glare." They say: "Protect yourself and the other fellow." You couldn't reasonably expect a driver to go to much trouble and expense to protect other people unless he is going to be assured of a reasonable amount of protection for himself. On the other hand, no one can possibly have any objection to complying with a law of this sort if he only realizes what the advantages are to himself.

Unfortunately, the public has been taught to think of lenses and laws as something inseparable, that a headlight law meant simply that they had to buy lenses to stop their glare. They have to be shown that a headlight law merely requires what common sense has always required—light that is safe to drive behind as well as safe to meet. Car manufacturers have been terribly misled, even to such an extent that the present practice is usually to adopt the cheapest device that will get by the laws, regardless of whether it gives the motorist the best possible light or not.

There has been entirely too much emphasis on *legality of light* and too little education on the *advantages* of legal light. Many accessory dealers have found that, after the first excitement due to the passing of a headlight law is over, their sales of lenses have practically stopped. It is a natural mistake to think: "How shall we get the police to enforce the law?" instead of "How shall we show the public that this is a good law that everyone should be anxious to comply with?"

There are two possible reasons for this falling off in the sales of lenses. One is that the lens the dealer is selling may not be a kind that would sell without a law, or that the dealer is not installing them correctly so as to give the kind of light that a user would recommend to his friends. The other reason is that most dealers have been trying to make capital of the wrong part of the law—the part requiring the stopping of glare, instead of the part requiring good driving light.

The first reason—the quality of the lenses—can easily be determined by the dealer, and should have been determined before he

started to handle them. If they do not give better driving light than some equally legal home-made makeshift, such as painting the upper half of the plain glass, there is no reason why anyone should spend his money for them. If they are only designed to stop glare, as is the case with a great many lenses, and there is nothing else to talk about, the dealer is up against it for a better talking point than "This lens complies with the law."

But that is something that the dealer should find out for himself, not by listening to salesmen but by putting a pair in his car and comparing them with others. It really has no place in this discussion.

No honest dealer is in favor of enforcing a law to make people buy poor merchandise, no matter whether it is lenses or tires or something else. Even vigorous enforcement of the laws will not sell any great amount of poor merchandise. If the line is right, no law is needed to make it sell. If the line is wrong, a law won't help very much.

The public needs education in regard to the advantages of better driving light—not police activity. If dealers will show the public that a glaring light is always an inefficient light, that better light on the road without glare is possible, the public will demand better light in spite of the fact that it is legal. But if dealers continue to encourage the public to think that complying with the law is a hardship, no matter whether it is done by actual statement or by the performance of the goods they sell, the same public will refuse to be bunkoed more than about so far.

Selling on the basis of better light and legality, instead of on the basis of legality alone, is the only way to build up a staple business on lenses.

DO YOU USE SYSTEM IN STORING STOCK?

(Concluded from page 30.)

you can post from that form; if not, posting can be done from invoices. The amount is posted and also added to the balance and the total brought down.

In the column "Returned" is posted any stock that is returned by the customer, or stock the dealer returns to jobber or manufacturer. When the stock is returned by customer, the entry is made in red ink and is added to balance. When returned by dealer, the entry is made in black ink and amount is deducted from balance.

INSTALLING BOSCH SYSTEM ON THE FORD.

(Concluded from page 25)

gaged with the ball joint at the foot of the steering column, to which the timer rod was originally connected. It is necessary to use this rod as the shape of the old timer rod is not such that it can be utilized.

With this last rod in position, we are ready to replace the fan pulley assembly

parts in their former position as soon as the spacing washer is placed back of the fan pulley to align it with the pulley on the crankshaft. We now find that, since removing the coil box from the dash, the head of the rod that supports the radiator stands out and makes a very unsightly appearance. This has been provided for.

First, it is necessary to countersink the head flush with the dash and place the little plate that is made for the purpose. The Bosch key is also to be fitted and connected, as this is necessary to stop and start the engine just as was the switch on the front of the coil box. Next, replace the radiator and bolt it securely. Place the gasket and tighten the connection just enough that it will not leak.

It is well to mention the fact that many of these water-outlet castings are broken in replacing by drawing one side too tightly before tightening the other. Therefore, each side should be tightened evenly. After refilling the radiator with water the engine may be started and tested and, if found perfect, the connections in the head-lights, etc., may be made.

In case the engine does not start readily, open the carbureter needle valve about one-half turn until the engine starts and readjust it to the proper position as soon as the engine warms up, for many times the valve will be moved accidentally and the correct mixture will not be taken into the engine until it is again set correctly.

As soon as the engine is started, the operation of the gears should be noted. If during the operation, the gears rise to a high pitch ring, it indicates they have been meshed too tightly in the installation while, if the noise is a rattling sound, it indicates that they have been adjusted too loosely. Either condition should not be allowed to continue but should be corrected at once as has been mentioned.

At this time we might mention that, in timing the magneto for Ford cars, the magneto armature is to be turned by hand—by means of the coupling—in the direction in which it is driven, until the first metal slipping segment is visible in the slipping groove. The trailing end of the armature is about 9/16-inch from the pole shoe on the right side of the magneto, viewed from the shaft end. The 9/16-inch distance should be measured very carefully as illustrated in Fig. 3 at E.

With the armature held in position as shown, the large gear is slipped into place on the camshaft and meshed with the idler gear, care being taken to see that the piston of No. 1 cylinder has not been moved from the dead center position.

When the Bosch system is installed on a Ford that is not equipped with a storage battery for lighting, the magneto may be used for lighting only and the light will be a great deal better as none of the current generated will be taken for ignition.

The users of the Ford Bosch equipment claim that ignition troubles are reduced to

a minimum, as there are no coil points to be adjusted and no timer to keep in condition. In fact, the Bosch system, outside of a few drops of oil occasionally, needs no attention from month to month.

An indication of ignition trouble is an uneven sputter and bang of the exhaust, which may be due to defective plugs, broken or loose terminals, etc. Misfiring, if allowed to continue, will in time injure the engine and the entire mechanism. Good drivers are known by the machines they drive. There is nothing to be gained by experimenting with "off brand" spark-plugs and equipment. Buy and use the goods advertised from month to month and handled by jobbing houses, and the chances are ten to one service and satisfaction is the word.

Statement of Ownership of "American Garage & Auto Dealer."

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of The American Garage & Auto Dealer, published monthly at Chicago, Ill., for October 1, 1921.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared S. R. Edwards, who, having been duly sworn according to law, deposes and says that he is the editor of the American Garage & Auto Dealer and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, postal laws and regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher, American Garage & Auto Dealer, Inc., 116 S. Michigan Ave., Chicago.

Editor, S. R. Edwards, 116 S. Michigan Ave., Chicago.

Managing Editor, S. R. Edwards, 116 S. Michigan Ave., Chicago.

Business Manager, J. R. Hastie, 116 S. Michigan Ave., Chicago.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)—H. D. Fargo, 116 S. Michigan Ave., Chicago; J. R. Hastie, 116 S. Michigan Ave., Chicago; S. R. Edwards, 116 S. Michigan Ave., Chicago; I. B. Lipson, Fort Dearborn Bldg., Chicago; J. W. Hastie, 26 S. Hamlin Ave., Chicago; E. C. Hole, 431 S. Dearborn St., Chicago; S. G. Levy, Fort Dearborn Bldg., Chicago; E. T. Clissold, 327 S. La Salle St., Chicago; R. S. Clissold, 327 S. La Salle St., Chicago.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

S. R. EDWARDS,
Editor.

Sworn to and subscribed before me this 27th day of September, 1921.

(Seal.)

E. V. CROSS,
(My commission expires Oct. 23, 1924.)

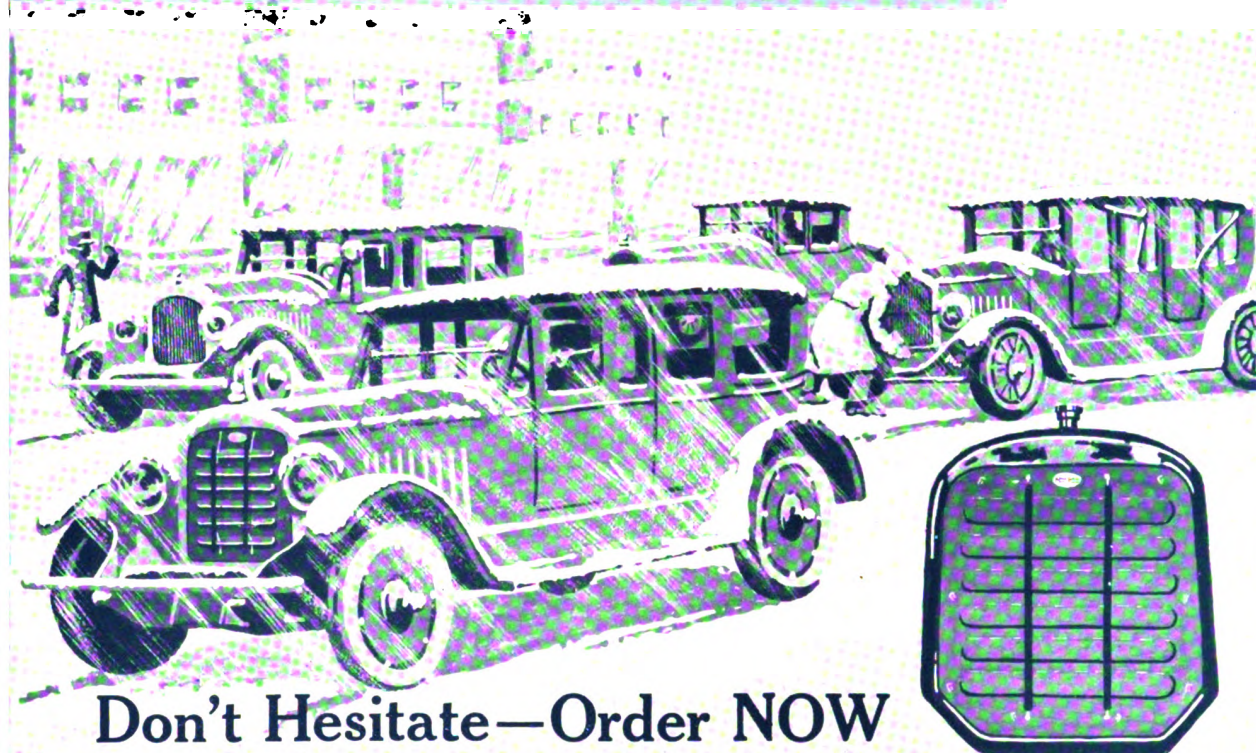
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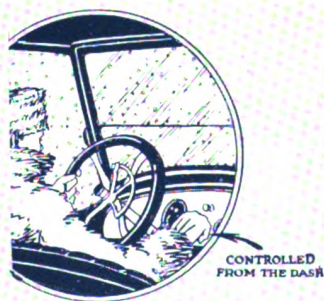
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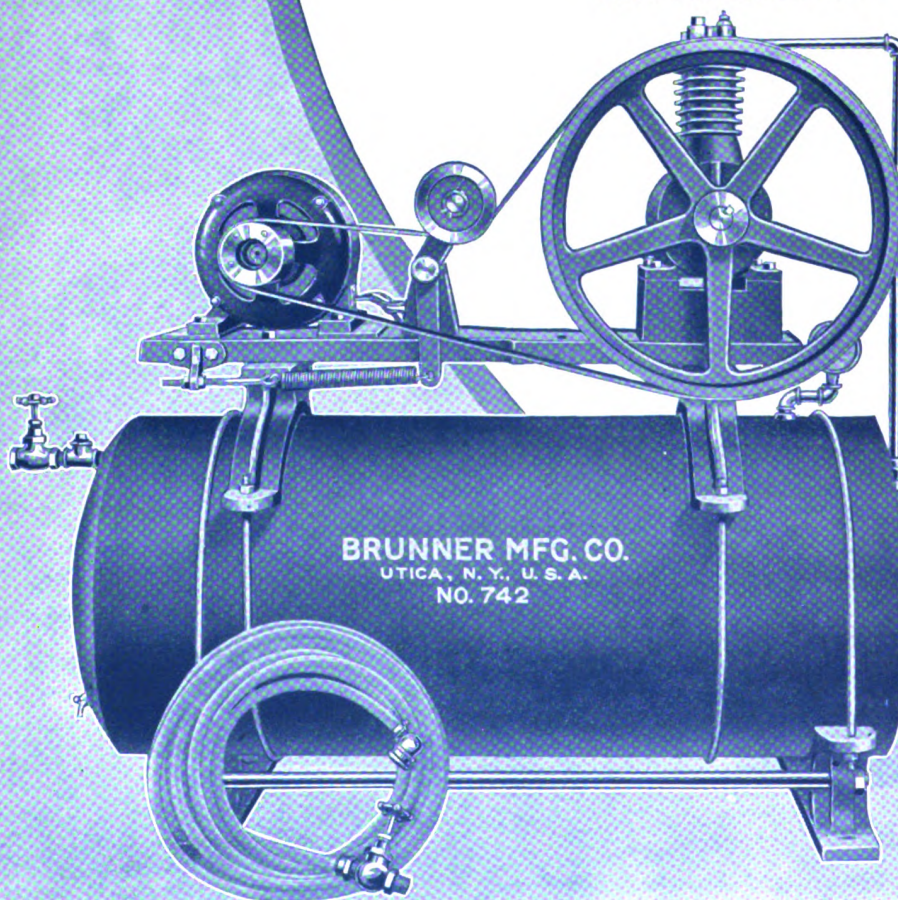
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ASK AN ENGINEER!



Practical Hints for Shop Mechanics

Removing Stubborn Studs.

Sometimes the mechanic runs up against a stud that is tightly set. It is difficult then to remove it without damaging the threads.

We find that the best method is to run on a split nut which fits the threads exactly. Then, if possible, place the nut in a vise and turn the work, and in nearly every case the stud will start without damaging the threads.

If the work is heavy, a small vise may be clamped onto the nut. Then turn the vise and nut with a large pipe wrench and out comes the stud.—L. V. C., Minn.

* * *

Wheel Puller Substitute.

A wheel puller substitute is very handy when a puller is not to be had. When the wheel is very tight on the axle, it cannot be pulled off by hand.

Sharp taps on the end of the shaft will bring the wheel off but the threads are easily battered up. Wooden blocks are sometimes used but, when much tapping is required, a wooden block will split up and will sometimes sting your hands.

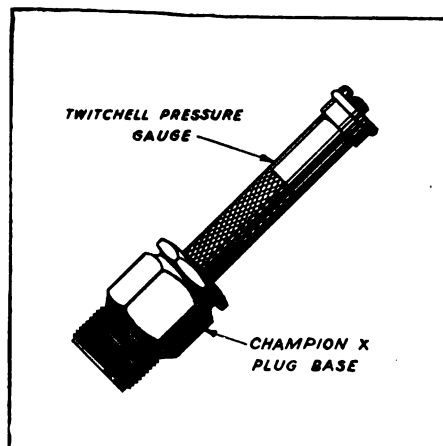
Take a small ball peenhammer and put the ball end against the end of the shaft, as there is always a small cavity at the end of the shaft. Hit the hammer with another hammer and the wheel will come off.

Other iron objects may be used, but they have not such a handle as the hammer. It acts more quickly and gives a more direct tap, as the wood acts as a sort of shock absorber and takes the jar out of the blow, which really takes off the wheel.—O. M. T., Ohio.

* * *

Gage for Testing Compression.

The illustration shows a simple gage for testing compression in automobile engines.



Useful and Easily Made Compression Gage. using a spark-plug base and Twitchell pressure gage. This is easily made and very useful.—R. S., Tex.

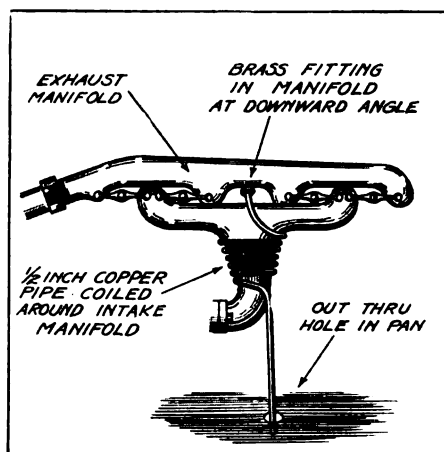
To Start Nuts on Ford Crankcase.

To start the nuts on a Ford crankcase arm-bolt, on cars that are equipped with starters, tie a piece of stove-pipe wire around the nut and drop into place. With the other hand, you can turn the bolt. After the nut is started, the wire may be taken off and the ordinary wrench used.—A. R. G., Mich.

* * *

Hot Spot Intake Manifold.

I am sending a drawing of a hot spot intake manifold. It is also a good plan



Asbestos Over Copper Pipe Holds Heat.

to wrap the intake manifold over the copper pipe with asbestos.—M. W., Wash.

* * *

Hand Hold for Screwdriver.

One's hands often become tired or perhaps blistered from using a screwdriver when putting into place or removing a number of large screws. If a hand hold about two inches in diameter is placed on the screwdriver handle, it will make the work much easier.

An old radiator cap of the proper size—that is, shaped so it is easy to grip—will serve well for this purpose.—G. E., Iowa.

* * *

Wheel Aligning Tool.

A simple tool for lining up both front and rear wheels is a piece of iron about 16 ft. long and about one inch in width, to which is welded at right angles another piece about 5 1/2 ft. long. With this device the rear wheel can be lined up with the front wheel, and at the same time the two front and the rear wheels.

* * *

Locating Engine Knocks.

Knocks are often somewhat hard to locate in an engine unless some sort of sound device is at hand. If a small rod about two inches long is fastened to the

diaphragm of a discarded horn, a good sounder will be the result.—S. E. G., Iowa.

* * *

Rack for Radiator Hose.

About the hardest thing in the stockroom to dispose of is the three-foot lengths of radiator hose. A rack for each size may be made in the following manner:

Take a 3 1/2-foot length of No. 12 wire and bend an eye on one end and a hook on the other. Attach the eye to a hook in or near the ceiling. Slip the hose over the wire and the hook and then let it drop back into the hook, thus keeping the hose suspended on the wire.

This keeps all the sizes in sight and allows any one to be removed without disturbing the others.—D. & F., Mo.

* * *

When Installing Piston Rings.

In putting in or compressing the rings, when inserting a piston into the block, a string may be used when a piston ring compressor is not to be had.

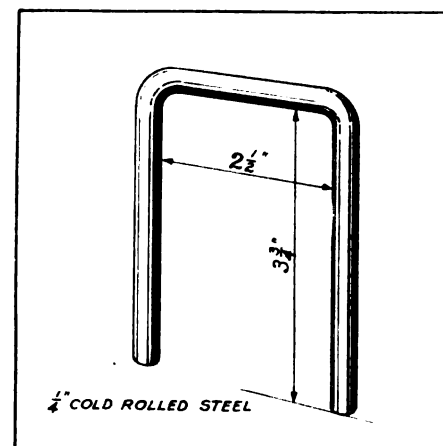
The rings are difficult to compress with the fingers and often injurious to the finger tips; especially new rings. Push the piston down until the ring touches the block and then lay a string all around it and pull, at the same time having someone tap the top of the piston.

Down it will slide if nothing prevents it from so doing. This method is just as good as if a two-dollar ring compressor were used.—A. B. M., Ind.

* * *

Holding Ford Transmission Bands.

The accompanying sketch shows a clamp for holding Ford transmission bands in



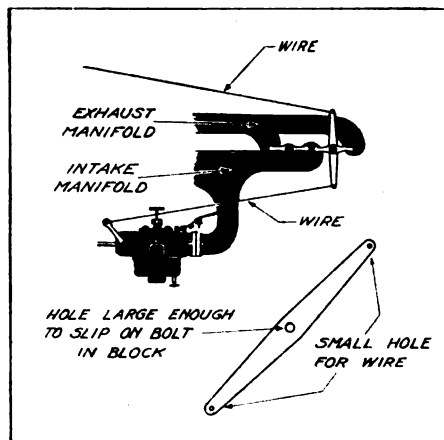
Handy Transmission Band Clamp.

place while replacing transmission case after removal for relining bands or removing motor.—B. O. B., Pa.

Choker for Cars Without Starters.

I am sending a simple sketch of a Ford choker for cars that have no starter.

Take a small piece of metal, about six inches long and about $\frac{3}{4}$ -inch wide, and drill a hole in the center and one at each end. Then take off the nut and the small brace that holds the intake and exhaust



For the Ford Without a Starter.

manifolds to the block and put the metal strip over the bolt, inserting it through the center hole. Put the brace and nut back on, and tighten up again as before.

Then run a wire from the upper end of the strip to the dash, where it may conveniently be reached by the driver when needed, and another wire from the lower end to the carburetor lever. The wire may be fastened to the same place where the regular Ford choker wire fastens to the carburetor.

This forms a leverage and makes a simple choker for the Ford. The regular Ford choker to the radiator may be used at the same time as the attachment gives enough in the wire for it to be regulated. —E. E. S., Iowa.

* * *

Wrist-pin Socket Wrenches.

The repairshop forge artist can make socket wrenches from discarded wrist-pins that will do stunts which the educated store wrenches do not understand.

Form a die the size of the nut for which the socket is to be made. The die can be shaped up carefully on the side of the emery wheel. Select a pin with a smaller center hole than the die and, after heating white hot on one end, drive a long, tapered punch into it to stretch it and make the side walls thinner.

Heat again and drive the die into it and form it to the die by hammering on the anvil. Treat the other end in a like manner, using the same die, but turn it so that the socket will grip a nut with the handle at a different angle from the one on the other end. Drill a hole through the center of the pin, when it cools, for a handle of cold rolled steel.

Make a third socket over the same die in only one end of the pin. Square the

other end and square the end of the handle to fit it. Let the torch artist weld the sockets to the handle and dress them up on the emery wheel. This steel needs no hardening.

By using the cross end for a handle, a nut in a difficult place can be put on, run up to place and tightened with the other end, or by putting a punch in the cross socket for a handle.

A Ford pin makes an excellent socket for crankcase and bearing work, while the Willys Knight pins are excellent for larger wrenches.—A. O., Penn.

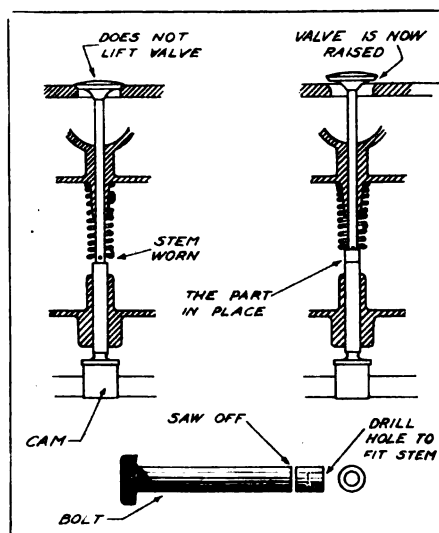
* * *

Valve Trouble.

Sometimes one may have trouble with a Ford that will not run evenly on all four, even after grinding the valves two or more times.

It may be that, when the head was removed and the valves taken out and ground, the cylinder that was weak had not the proper valve lift to make enough space for the exhaust to escape, as shown in the drawing.

This can be caused by the valve stem being worn off at the bottom, or the push rod may be worn off, causing about one-



Valve Lifter Made From Steel Bolt.

eighth of an inch clearance between the valve and the lifter.

This may be remedied in the following way: Take a steel bolt about a quarter of an inch larger in diameter than the valve stem and bore a hole in the end of it about $\frac{1}{4}$ inch deep. Saw it off and emery it down so as to make it about the size of the push rod. Then cut it off, allowing plenty of room so that when it is inserted after the valve has been replaced on the bottom of the stem it will bring the space within the required distance to make the valve lift properly.

This help has been used several times very successfully in our shop and saves several hours' work in removing the camshaft and push rods, as well as several dollars to the car owner.—G. F. H., N. C.

Sharpening a Screwdriver.

A good, sharp screwdriver is about the nicest tool to use in the shop, but one that is not sharpened properly is a very poor tool.

The method used in our shop for grinding them is very simple. The screwdriver is held on the grinder in such a position that the stone does not grind to the extreme point of the screwdriver but just a trifle back of the point, keeping the point of the screwdriver raised a little off the stone. This produces a hollow-ground driver point.

By hollow grinding, a point is produced that is wider at the extreme end than it is back from the edge.—G. W. L., Pa.

* * *

Cleaning Out Gas Lines.

The poor gasoline on the market today is responsible for the gas lines of many cars becoming plugged with sediment. To eliminate the necessity of taking out the gas line to clean it, one garageman has made a special cap fitting the gas tank of the car on which he gives service.

An ordinary cap is drilled out and tapped to suit the outside thread on a valve stem. A stem, cut off near its base, is screwed in and the thread joint made airtight by running solder about it.

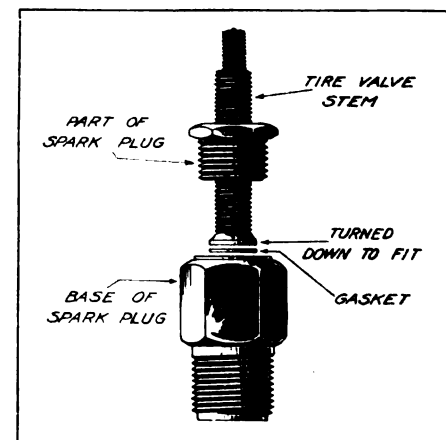
If a gas line becomes plugged, it is disconnected at the carburetor end, the special cap screwed on the gas tank and air pressure applied. Sediment is blown out the carburetor end of the line.—L. R. B., Iowa.

* * *

Finding Weak Compression.

The illustration shows an easy method of assembling the base of an old spark-plug and a tire-valve stem in a way that may be used for testing compression in the cylinder of a gasoline motor.

After the base of the spark-plug and tire-valve stem have been assembled, as



Effective Compression Tester.

indicated in the illustration, and screwed into the spark-plug hole of the motor, the amount of compression of the cylinder may be found by applying an ordinary tire tester to the valve stem.—G. E. P., N. Y.

Readers' Questions and Answers

Maintaining Adequate Pressure.

It is difficult to get the right feed pressure in a car which we have. The pressure does not drop quickly, but seems just to gradually ooze away. What would you suggest?—N. R. S., Ga.

We would suggest that you first inspect the filler cap of the tank. If a leather gasket has been used, the leather may be hard and caked. If a rubber gasket, the rubber may have become spongy. Possibly some foreign matter has lodged between the cap and its seat.

Generally, a pressure of $1\frac{1}{2}$ pounds is enough to insure an uninterrupted supply of fuel in the carbureter. It sometimes happens that the pressure in the system has been built up until the small valve operated by the carbureter float cannot restrain the fuel, in which case flooding of the instrument results.

* * *

Lubricating Air Compressor.

Will you please publish in your magazine some suggestions for the lubrication of air compressors? Any information you can give me will be appreciated.—C. I. B., Ill.

The proper lubrication of the compressor is, of course, very important. However, it is frequently found that air compressors are over-lubricated. The amount of lubricant used should never exceed one-fourth of the amount required for a steam cylinder of equal size. Some authorities advise the use of only one-tenth the quantity required in a steam cylinder of like capacity.

Frequently a deposit of carbon and oil is formed in the air compressor, due to the carbonization of oil, and is caused by the use of too much or improper oil.

Only a purely mineral oil should be used—never vegetable or animal oils as they are deleterious. The oils should be sufficiently viscous to resist the tendency of the piston to wipe it off but not enough to retard motion.

* * *

Battery Cells in Poor Condition.

I should like to know some of the ways in which one can tell when the cells of a battery are in poor condition. Can you give me any help on this?—L. L. B., N. J.

The following are some of the indications of cells which are not in good condition:

When a positive plate is wet, if in good condition the color will vary from a rich dark (almost black) brown if the plate is fully charged to a reddish, fairly dark brown when the plate is discharged. You may find a light grayish coating on the positive plates but this is not necessarily an indication of a bad condition as it may be found by rubbing the plate with a piece

of hard rubber that there is a good color just below the surface. For the dried plates, the color is a great deal lighter.

When the wet negatives are charged, they will be of a light slate gray and will be somewhat darker if discharged. When dry they are considerably lighter and may be yellowish if they are allowed to heat in drying.

It is probable that the plates are sulphated if the coloring is not as has been described. In cases where the cell voltage is considerably lower on discharge or higher on charge than it should be, sulphating of the plates is also probable.

When the acid strength is low, either short-circuits or sulphated plates will likely be found.

The hydrometer should be used as a guide in determining the condition of the cell, more particularly of discharge and charge. Much regarding the cell's condition may be learned from the correct interpretation of hydrometer readings.

* * *

Gasolene Substitutes.

Can you kindly give us some of the formulas for gasolene improver, so-called? Let us have the formulas, if possible, in liquid and tablet form. We refer to the

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

dope preparations that are added to gasolene to give it more pep.—W. L. W., Ohio.

We assume that the "gasolene improver" to which you refer, and for which you request a formula, is a gasolene substitute.

The subject of gasolene substitutes is one of particular interest, although definite information concerning it is decidedly limited. The first fact of importance to be recognized is that motor fuel is essentially

a source of energy and that the energy must come from somewhere.

The type of gasolene substitute of most importance at the present time, is the mixture of hydrocarbons obtained as a by-product in the coking of coal. These so-called coal-tar distillates, including benzol, toluol, xylol, etc., are hydrocarbons which are somewhat similar to the hydrocarbons found in petroleum, although, of course, there are well-recognized physical and chemical differences.

The following mixtures have been proposed by various authorities:

Alcohol 1 part
Ether 2 parts
"Engine distillate" (kerosene) .24 parts
(25 to 40 parts of gasolene may be used instead of the kerosene).

Ether 1 part
Alcohol 2 parts
Benzol 24 parts

Crude petroleum..... 1 gallon
Gasolene 3 pints
Ether 2 oz.
Pulverized alum..... 2 drums
Oil of citronella..... 2 drums

Kerosene 1 gallon
Methyl ether..... 4 ounces
Carbon bisulphide..... 8 ounces

Still another advocates the use of 1 part of benzol to 1 part of alcohol, stating that the distance traveled on pure gasolene was 25 per cent less than on this mixture.

This authority claims that pure gasolene of low volatility gives greater horsepower than is needed by the car and that, therefore, it is wasteful and that a gallon of it will not carry the car as far as a gallon of the alcohol-benzol mixture.

Benzol used alone requires considerably more air for complete combustion than gasolene, and gasolene carbureters have refused to work properly when called upon to handle benzol or alcohol.

On the other hand, alcohol can be compressed far more, requires less air, and can stand greater heat without pre-ignition than gasolene. Mixtures of alcohol and benzine, calculated so as to equalize the excess of air required by benzol with the excess of fuel required by alcohol, can be used in the ordinary gasolene carbureter, without any adjustment whatsoever as far as the air inlet is concerned. Such mixtures, it is said, will not form carbon deposits, not even in the oldest type of motors.

The greatest drawback to the use of benzol-alcohol mixtures in automobile motors still remains the low volatility of the fuel and the necessity for pre-heating it or for heating the motor itself. It is very difficult to start a motor on the benzol-alcohol mixture.

It is also said that the benzol dissolves the shellac coating on the carbureter float and that the latter should be made of metal or a single piece of cork, small enough to allow for swelling.

While the benzol and other coal-tar distillates have certain disadvantages when compared with petroleum gasoline, they have other very marked advantages, particularly in freedom from a tendency to knock.

Another advantage lies in the fact that they have a considerably higher calorific value per unit volume and, as this is the basis upon which the user buys, he gets more for his money than he would from petroleum gasoline. It is believed that coal-tar distillates, if properly used, are very satisfactory motor fuels.

The substitute fuel should be given a fair trial but the user should be satisfied if it is as good as gasoline and should not expect it to be notably superior.

* * *

Soldering Electrical Connections.

Can you give me a good method for soldering when connecting wires carrying electric current to terminals?—B. R. S., S. Dak.

When soldering these parts, be careful to see that the solder does not flow on any part of the wire except the terminal, as the heat may make the wire brittle and cause it to break.

The soldering should, of course, be done as soon as the connections are made. The tinned surface of the soldering iron should be held close to the places where the junction is, and the iron should be held steadily in one place so that the solder will flow freely on the connection.

The art of good soldering consists in heating the soldering copper to just the right temperature to quickly heat the parts to be soldered. The parts must be thoroughly cleaned before soldering is attempted and a good flux or flux solder used.

* * *

Removing Carbon Deposits.

Can you give me a good formula for removing carbon deposits in an air compressor?—A. J. D., Mich.

Every effort should be made to prevent and remove the accumulation of carbon, and jackets should be carefully watched for sediment or scale.

Generally, this deposit of carbon is due to the use of too much or improper oils in lubricating. Oil should be 100 per cent mineral and vegetable and animal oils should never be used.

The carbon from the asphalt base oils is easily removable, while that from paraffine base oils is very hard, gritty and particularly adhesive.

Hard carbon deposits will prevent the compressor valves from closing properly, and often result in serious overheating.

We would suggest that you try feeding a mixture of one pound of soft soap to

seven or eight quarts of water into the cylinder, in place of oil, two or three hours a week. This usually helps. The use of kerosene or inflammable solvent with air is dangerous.

* * *

Clutch Slips.

I have a 1917 model, four-cylinder Studebaker car, and the clutch is giving me considerable trouble by slipping.

I have flushed the clutch lining with gasoline and have also used some Fuller's earth on the clutch lining. It will hold well for a day or two and then it will slip again. This is quite annoying, especially in operating the car up the slightest grade, and I wish you would suggest a remedy through the columns of your garage paper.—E. G., N. Y.

We would suggest that perhaps considerable sand or dirt has accumulated on the lining of the clutch.

This may have been splashed in when traveling over muddy roads, or otherwise collected, and is almost sure to happen if the pan is left off that covers the flywheel under the car.

We recommend that you remove the clutch from the car by dropping the drive shaft. Then remove all dirt or grit that has accumulated on the leather facing of the clutch; also wash the facing thoroughly with gasoline.

Dry off the gasoline and apply a good grade of neat's foot oil. Reassemble the clutch and drive-shaft, and your clutch should give you no further trouble from slipping.

* * *

Overhauling Vacuum Tank.

We have a vacuum tank to be overhauled and should appreciate it if you will tell us the best way of handling the job.—F. H. R., Cal.

Generally speaking, it is unwise to tamper with or try to improve upon the construction of the tank. The air vent may allow a small amount of gasoline to escape but if this is the only difficulty no adjustment need be made.

However, if the vent tube overflows regularly, it is possible that the air hole in the main gasoline tank filler cap has become clogged and should be opened up.

When the gasoline leaks from some other source than the vent tube, examine the outer wall of the tank and if a hole is found solder it up. Notice the carbureter connection in the bottom of the tank to see whether it has become loose. Examine the tubing for leaks.

Always be sure that the trouble is not located somewhere else than in the vacuum system before overhauling the tank. If the gasoline runs out of the carbureter float chamber after the carbureter is flooded, undoubtedly the gasoline is being properly fed to the carbureter.

Or, you may remove the top and take out the inner vacuum tank, leaving only the outer shell. Fill the shell with gasoline. If the engine still will not run properly, the fault is not in the vacuum system un-

less there is an obstruction in the fuel line leading to the carbureter.

If you find the faulty feeding is due to trouble in the vacuum system, make the following inspections carefully:

The carbureter mixture may be too rich, or the connections may be so loose that air is drawn into the manifold.

Adjustment of the carbureter may be needed, or tubing may be clogged.

Examine the gasoline strainer to see whether the filter screen has become clogged with extraneous substances. This screen should be cleaned every three weeks.

Possibly some dirt has gotten under the flapper valve. In order to determine whether the trouble is here, first plug up the air vent. Then detach the tubing running from the bottom of the tank to the carbureter, start the engine, and apply a finger to this opening. If there is a continuous suction, there is likely a leak in the connection between the tank and the main gasoline supply or the flapper valve is being held off its seat and is letting air into the tank instead of gasoline.

Carbon is sometimes pitted on the flapper valve and may prevent the flapper valve from being held tightly on its seat. This should be removed by scraping the valve with a knife.

The float should be air-tight. Examine this, also, for leaks.

* * *

Camshaft End Play.

Please print in your magazine what you consider the best method for removing camshaft end play.—L. T. D., Cal.

It may be necessary to put in new bushings, or it is possible that the proper adjustments will take care of the trouble.

Most of the adjustments are located at the end of the camshaft. Usually there is a small pointed tip of metal in the timing-gear case, with a spring which rests against the end of the camshaft. The only repair in this case would be to put in a new part. The manufacturer's handbook should be consulted in order to locate the adjustment and decide where new bushings must be installed.

* * *

Battery Terminals Need Cleaning.

A battery which we have gives a weak spark, although it shows a full hydrometer reading. How would you suggest that it be handled?—T. J. J., Tenn.

It is probable that the terminals are corroded, in case the hydrometer shows the full reading and there are no loose connecting straps.

We would suggest that you remove the caps and wires from the battery, and then apply a mixture of baking soda and water to the posts to which the battery wires have been attached. This mixture should be about the consistency of cream.

Leave the mixture on for about 15 minutes, then remove and rub the terminals with a stiff wire brush. Apply a light coating of vaseline and replace the wires.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, 1-731 National Bldg., Cleveland, Ohio

4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
1-731 National Building, Cleveland, Ohio

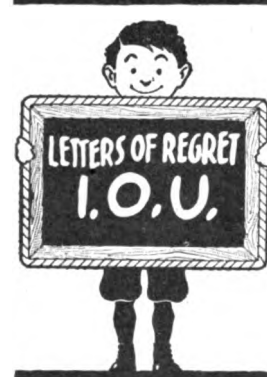
Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

City..... State.....

I now sell..... Oil.



Giving a Square Deal in a Blind Game

Sampson Electric Co. of Chicago, Widely Known for Its Policy of "Service by the Golden Rule," Tells of Unique Follow-Up Plan for Digging Up the Dissatisfied Customer—Read Here the Interesting and Gratifying Results

Everywhere in the industrial world the idea of "Service first," is taking root, and wherever you find a business of any kind that is flourishing and prospering, you are pretty sure to find also that real service—and consideration for the "other fellow"—is the basis upon which its success has been built.

"An exceedingly interesting experiment is reported by the Sampson Electric Co., 2334-40 S. Wabash Ave., Chicago. This company, as will be remembered, is becoming nationally known for its consistent policy of "Service by the Golden Rule."

Recently, a circular letter was sent out to the trade, following up repairs made, the purpose of the letter being, in the words of President Peter Sampson, to "create good will, educate the public that we really give them service by the Golden Rule and, last but not least, to dig up those dissatisfied customers who would rather go somewhere else and spend more money than come back to us for adjustment, and giving them the opportunity of coming back without any fear of being called a kicker and receive full value of whatever money they have left with us." Here is the letter, which was personally signed by President Sampson:

In keeping with our policy of "Service by the Golden Rule," we wish to inquire whether or not the repairs to the generator of your _____ car, furnished by us some time ago, were entirely satisfactory.

The prevailing opinion regarding service stations is none too savory, and is, we regret to say, too often based on fact. In servicing your starter, generator or ignition troubles, our interest does not cease with the payment of our bills. If there is anything we have overlooked, or any trace of dissatisfaction in your mind as regards our services, please advise us regarding same.

We want our service to be so different from that offered in the ordinary establishment devoted to ignition, lighting and starting, that the mere mention of our name will breed confidence in every car-owner's mind.

If our service has pleased you, may we ask that you pass the good word along to your friends. They, too, might appreciate a square deal in a blind game.

The results, says Mr. Sampson, were wonderful.

From many sources have come complaints regarding the treatment received by the tourist from servicing stations. The Sampson Electric Co. makes just as much effort to give the tourist—who is in absolutely no position to do it either harm or good—just as square a deal as the man who lives next door and is in a position to do either harm or good.

As evidence of this, the following letters from car-owners in Cincinnati and Des Moines—who received service for electri-



"A Square Deal" to All Comers is Assured at This Servicing Station.

cal trouble by the Sampson company while they were touring through Chicago—are noteworthy:

Sept. 6, 1921.

The Sampson Electric Co.,
Chicago, Ill.
Gentlemen:

Your very unusual letter of July 29th comes to my attention upon my return today, and I can not pass it without reply.

Since your repair of my generator, my car has driven 6,000 miles, and I have had no trouble with it, whatever.

I want to assure you that I do appreciate "A square deal, in a blind game." I shall be glad to refer any future trouble in your line to you and shall assuredly speak a good word for you among my friends.

The second letter reads:

Des Moines, Iowa.

Aug. 13, 1921.

Sampson Electric Company,
Chicago, Illinois.

Dear Sirs:

I have your letter of the 11th inst., asking about the generator on my Lexington car, which you repaired while I was in Chicago about a month ago.

I think it is working well. I have heard a few squeaks from some place down in the internals of my car, but do not believe it is from the generator. I keep it well

oiled and believe it is going to work well.

Let me thank you for writing me. You are different from most of your tribe—very much different, thank God. I have been through the hands of a good many—and let me again say—you are different. I hope you succeed, and you can just bet that if I can do you a good turn, I will do it. If you do not succeed it will be because people do not appreciate a square deal.

Service—"Golden Rule" service—is the motto of this big and busy servicing company. Certainly its unfailing adherence to this standard is building a national reputation for square dealing—and a splendid business.

It is interesting to note that the Sampson Electric Co. has recently taken on the distribution of the Ray battery in 35 counties in Illinois and Indiana.

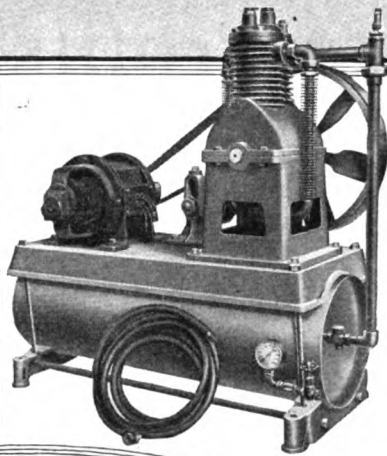
This battery is sold on a two-year, unconditional guarantee which means that the customer is entitled to a new battery at any time in the course of two years, should his old battery go wrong for any reason whatsoever outside of wreckage. The Ray battery is even guaranteed against freezing, over-

charge, running without water, etc.—in other words, it is guaranteed not only against defects in manufacture but against the carelessness of the owner himself—a broad guarantee indeed.

Other activities recently added to the Sampson service are: Official service station for Bosch Magneto Corp., Gray & Davis starting and lighting equipment; official service station and distributor of the line of cut-outs, switches, panels, etc., manufactured by Briggs & Stratton, of Milwaukee; jobbers of Atwater-Kent igniting, starting and lighting parts; National Carbon company, Pyramid brushes; Eclipse Machine Co.'s Bendix drives; Link-Belt Co.'s silent chains. It is also authorized dealer for Delco and Remy starting, lighting and ignition apparatus.

Paragraph.

A. SCHRADER'S SON, INC. has announced an appreciable reduction in prices on the following: Schrader universal tire pressure gage; Schrader universal truck tire gage; Schrader universal valve caps; and Schrader universal valve insides.



CURTIS TWO-STAGE AIR COMPRESSORS

An Original Design

Curtis Two-Stage Compressors embody every good feature of single-stage plus two-stage efficiency. Have all the exclusive features that established our single-stage so firmly on the market—and in addition have all possible advantages of two-stage compression.

Aeroplane type COPPER inter-cooler with thin copper radiating fins rigidly attached, assuring most efficient cooling and fullest advantage of two-stage compression. Built in several styles in two capacities. Ask your jobber. Insist on a Curtis. Rather than accept a substitute, write us direct.

FREE
CURTIS AIR
FREE FROM OIL

Curtis Pneumatic Machinery Co.

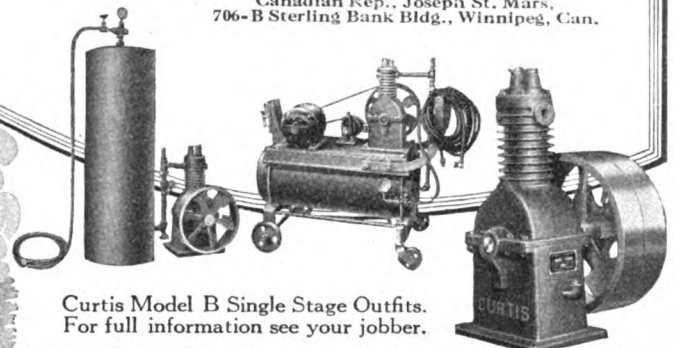
1515 Kienlen Ave.

St. Louis, Mo.

Branch Office:

530-U Hudson Terminal, New York City

Canadian Rep., Joseph St. Mars,
706-B Sterling Bank Bldg., Winnipeg, Can.



Curtis Model B Single Stage Outfits.
For full information see your jobber.

Your Trademark in a Flexlume Electric Sign

The trademark of your product—car, truck, tire, accessory or whatever it may be—reproduced in the raised, snowwhite glass letters of a Flexlume Electric Sign will connect your place of business with the big organization the trademark stands for in the public mind.

Flexlumes are perfect day signs as well as night signs. They have greatest reading distance, lowest upkeep cost, most artistic designs.

*Let us send you a sketch showing a Flexlume Sign
to meet the particular needs of your business.*

FLEXLUME SIGN COMPANY

25 KAIL ST.

BUFFALO, N. Y.

Flexlume—Electric Signs Made Only By The Flexlume Sign Co.

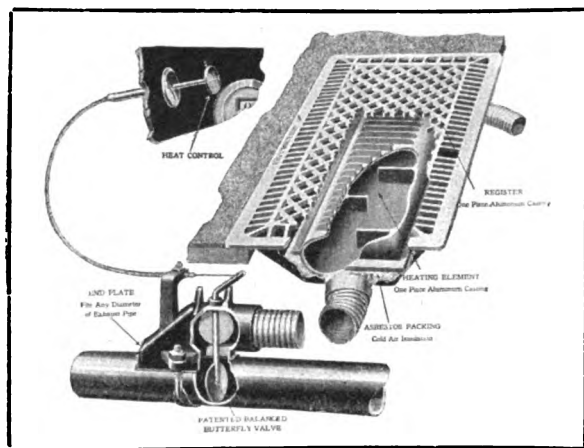


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Accessories—Dealers' Key to Profits

Make Winter Driving Comfortable With a Chanson Car Heater.

The sudden coming of chill Autumn days, on the heels of an especially hot summer, has forcibly brought home to motorists the desirability of installing heating devices. The Channon-Hughson Co., 225-231 West Erie street, Chicago, in announcing its



No Exhaust Noise With Chanson Car Heater.

"Chanson Car Heater" at this time, has a message which will be gladly received.

The Chanson car heater is the fruit of many exhaustive tests and experiments by Channon-Hughson engineers in producing a car heater that is regulated exactly in the same manner as the heat in your own home, and is, at the same time, so reasonable in price that no car owner can afford to be without one. The Chanson car heater has been pronounced a complete success in car heating by many hundreds of delighted users.

The flush-type floor heater is made of one-piece aluminum casting, with no joints to loosen and allow exhaust gases to get into the car. The car is, therefore, absolutely odorless, it is said and, with baffles integral in casting, absolutely quiet as well. It is further claimed that no exhaust noise whatsoever is heard.

The heater casting is so designed that it forms a solid bottom in the pan. Articles falling on the heater may be picked out as easily as off the floor of the car. The aluminum cover on the floor grating is hinged to the heater pan. This is held in place by springs, so designed that they prevent all rattle and noise and, at the same time, allow the cover to be swung open to get at anything that has fallen into the heater.

There is also a trapdoor in the side of the heater pan which permits litter from the car to be removed. With a Chanson car heater, the dirt may be swept from the floor of the car into the grating and, by means of the trapdoor, dumped upon the ground. This does away with the nuisance

of sweeping over door sills. There are no odors of dirt burning on the heater.

The control valve can be mounted on any pipe of any diameter by carrying only one type in stock. This valve is furnished with several end plates of various diameters, which can be put on the valve by removing two screws—a unique feature which takes care of the various diameters of exhaust pipes.

The valve itself is a double butterfly balanced type. This means elimination of any springs and, consequently, no looseness or chattering of the valve due to loss of tension in the control spring.

The pressure of the exhaust gas against one valve is balanced by the pressure of the right angle valve on the other end of the stem. This, being even, allows the valve to set at any angle opening, the control being accomplished on the instrument board by a device similar to the choke control of

the carburetor and as easily operated.

The Chanson car heater is furnished with five feet of control wire and five feet of flexible tubing, so that the valve may be set at the most convenient point on the exhaust pipe. Four feet of tubing is furnished as a tail pipe to carry all exhaust fumes far to the rear of the car.

In the Chanson car heater—foot rail type—a heater is provided for those who do not care to saw through the floor boards of their car for the flush-type heater. The foot-rail heater has ample radiating service, consisting of two pipes securely clamped to the end casting with copper asbestos gaskets and sealed with fireproof cement, preventing any possibility of odors escaping into the car. The double-balanced, positive valve control accomplished from the instrument board immediately regulates the amount of heat desired with the setting of the valve.

The end castings require two 2½-inch holes cut in the floor boards, and the heater is mounted in the most convenient place as a foot rest. The heating element is protected by a perforated covering with sufficient clearance to prevent the possibility

of anything burning which may be resting upon the heater. The exhaust inlet and outlet at each end are insulated from the floor board by air space and asbestos packing, making it absolutely impossible for the floor board to become overheated.

As in the case of the flush-type, plenty of tubing is supplied to permit installation of the heater anywhere on the exhaust pipe and to carry away any accumulation of gases when the car is standing.

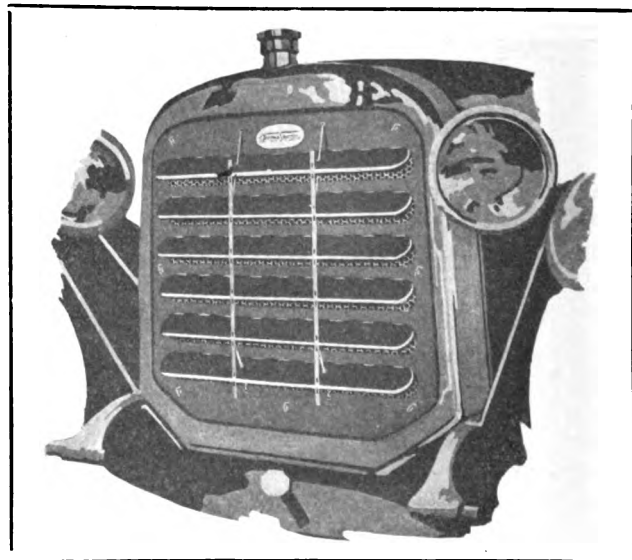
In the Chanson car heater of the flush type, the heating element is insulated from the outside cold air under the car by a heavy asbestos fire felt between the heating element and the bottom of the pan. This forces all the heat into the car.

Due to the scientific arrangements and careful packing of the heating element, heat is available in less than a minute after starting the engine.

New "Overcoat" Brings a Summer Song from Winter Motor.

The Thermo shutter is a boon to the motorist in the protection which it affords his radiator. It is made of a leather-like, fibrous material, operates from the dash, and can be adjusted to any climatic condition.

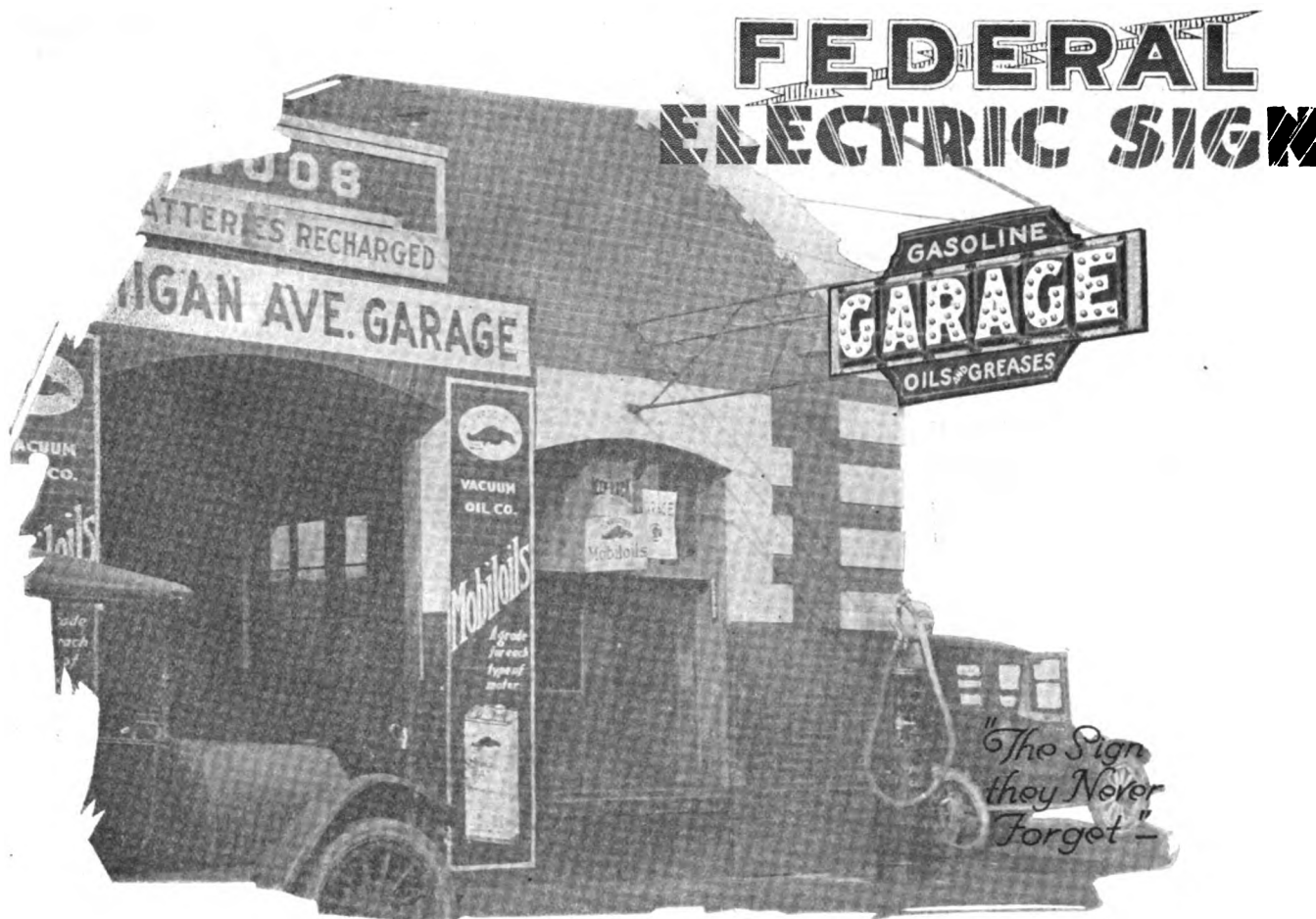
The Essential Automatic Products Co., 505 West 42nd St., New York City, which is the manufacturer of this device, calls it



Thermo Shuts Out Cold and Keeps In Heat.

an "overcoat for radiators," in that it shuts out the cold and keeps in the heat when it is desired.

Engineers and automobile owners have endorsed the idea of radiator shutters as enhancing the appearance of an automobile, and also as an economy from the standpoint of saving gasoline and battery.



—It Gets the Business



12 Months to Pay.

The first payment brings you your sign—you have 12 months to finish payment.

Because their garages are lost in darkness, many garage owners lose many sales. Their competitors, with glittering electric signs lighting up their garage front, pull much of their paying profits away from them.

Prospective customers will not waste their time trying to find you. They know what they want and need and will go direct to that garage that advertises for their

patronage—a Federal Electric Sign draws them like a magnet.

And an electric sign is really the most inexpensive of advertising media. Costs but a few cents a day for electricity. Made of porcelain enameled steel—will not rot, rust or fade, and will last indefinitely.

Gain a step on competition. Send coupon today for full details, prices and **free sketch** showing how your sign will look.

Tear off and Mail Coupon Now

FEDERAL ELECTRIC COMPANY

Representing Federal Sign System (Electric), 8700 South State Street, Chicago, Ill.

Please send me full information, price and free sketch of a Porcelain-enameled Steel Sign for my business. Explain your 12-months-to-pay Plan

Name City..... State.....

Street and No..... Business.....

Store Frontage..... No. of Floors

AGAD-11

The manufacturers take pride in having produced a high-grade durable article which retails at a low figure yet does the work as effectively as the most expensive shutters.

The Thermo shutter is so constructed that it deflects rain, sleet and snow away from the radiator and it is said that actual tests have proven that cars equipped with this device have shown a saving in gasoline consumption of 30 per cent. This economy alone pays the initial cost of the shutter within a few days and its continued use pays additional dividends as time goes on.

Car Owners Will Appreciate the Pocket Auto Expense Ledger.

Have you seen the pocket automobile expense ledger? Dealers, particularly, will be interested in this little pocket ledger, which enables the car owner to keep an accurate record of the expenses incidental to the maintenance of his car, in addition to insurance records and other items of importance and interest.

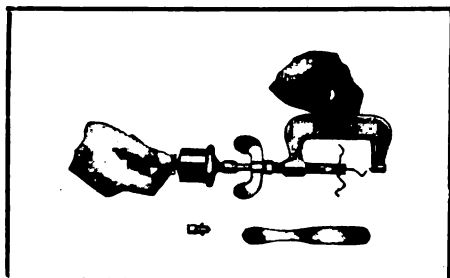
The pocket ledger is put up in a form that makes it possible to sell it for an exceedingly small sum. For the garage-man it offers a very practical suggestion for some good advertising as it can be furnished with his imprint or advertisement on the back to be given to customers, who will be most appreciative of its convenience.

For further details write the Herald Printing & Publishing Co., 657 Fifteenth Ave., East Moline, Ill.

New Turner Spring Leaf Spreader and Lubricator.

The newest of the products placed on the market by the Turner Mfg. Co., of Kokomo, Ind., is the Turner spring lubricator. It is said to be the only spring lubricator on the market that will spread the spring leaves and lubricate them in one operation, positively and quickly and without muss.

It is evident that such a product is a boon to every car owner. It is claimed that it will greatly increase the riding qualities of any car and will enable the driver to keep his springs properly lubricated at all



Keeps Automobile Springs Properly Lubricated.

times; will eliminate squeaks and greatly lessen spring breakage; and will greatly increase the life of the springs, make steering easier and save tire wear.

The Turner spring lubricator meets up

in every way with the rigid standard of Turner quality. It is carefully constructed of best materials and is backed by the factory guarantee.

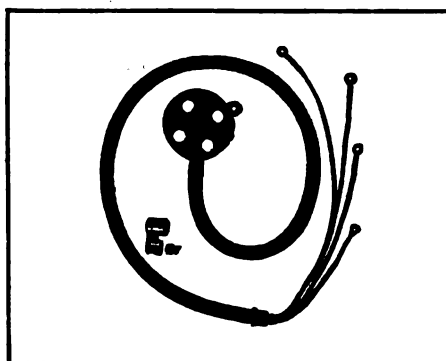
The Turner Two-in-One Timer Success Under Rigid Tests.

The Turner timer, manufactured by the Turner Mfg. Co., of Kokomo, Ind., is a product that has been undergoing the most rigid tests for the past four years. It has stood those tests and its success with Ford owners in every part of the country, it is said, has been remarkable.

The manufacturers have tried from the start to be conservative in their claims and have always avoided glittering generalities in putting forth the merits of their product. They have always preferred to tell what it will do and why it will do it.

The Turner timer is designed to eliminate starting troubles in cold weather. In most instances it stops the fouling of the two front plugs. The hot spark, a result of Turner construction, results in a great saving of fuel.

It eliminates "kicking" by the motor because it gets entirely away from oil and water-soaked wires. The wiring system—which is a part of the timer—is oil, grease



Designed to Eliminate Starting Trouble.

and water-proof. The Turner timer can be installed by anybody in ten minutes. It has but two moving and wearing parts and requires no oiling.

It is a genuine quality product throughout, carefully made of the best procurable materials and fully guaranteed by the manufacturers.

Lyon Convex Bumpers of Unusual and Distinctive Design.

An unusual and distinctive design of resilient bumper is being marketed by the Metal Stamping Co., of Long Island City, N. Y., which is known as the new Lyon convex bumper.

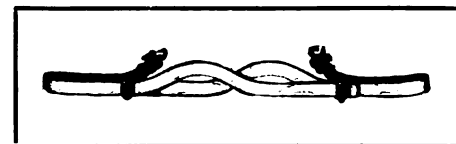
The Lyon convex bumpers are built of the best spring steel, heat-treated and oil-tempered throughout. The attachable arms are integral parts of the bumper and have absolute spring action under collision impact, it is claimed.

They are guaranteed to withstand shock

of bumping at 15 miles an hour, without damage to either the car or the bumper.

These bumpers are manufactured for both front and rear. The front bumper has an upwardly extending, broadened bumping surface which affords protection to lamps and radiator, and can be supplied with either three-way or new-way fittings. It weighs only 39 pounds.

The rear bumping surface extends down-



Lyon Convex Bumper—Front.

ward instead of upward and completely shields the gasoline tank. It is made with frame clamp fittings only.

All bumpers are individually crated and are made in black with nickel clips and nickel with black clips.

Drive Fordson Like a Team with Cole Line Drive.

"It surely is a dandy outfit," writes one pleased customer of the Cole line drive for tractors.

With this attachment, it is possible to operate the tractor from the seat of the implement, thus, it is said, enabling one man to do what before took two. Farmers will readily recognize the advantage of being able to get back on the implement and so see what is being done and doing better work, as well as doing it more easily.

With two lines the tractor is steered, the clutch operated, the gears shifted, and the throttle controlled. A triangle on top of the steering wheel makes the tractor go straight ahead or follow the furrow if the lines are left alone. A hook controlled by the right line holds the clutch "out" or releases it at will.

A pole holder, or universal hitch, enables the farmer to use all horse-drawn implements with the Fordson with no change in the implement. The regular Fordson seat can be put on or taken off without bolts or nuts.

It is claimed that the right line, which is carried forward during belt-work, gives control of the clutch and becomes a "Safety Line" and saves one man.

The Cole Mfg. Co., 1234 Central Ave., Minneapolis, Minn., will gladly supply complete details concerning this useful device.

New One-Man Top a Real Boon to Ford Owners.

Those who are interested in top building and automobile trimming will undoubtedly be glad to know that there has been brought out a special outfit, designed with a view to supplying their needs for the thousands of one-man top jobs that are being placed on



Winter radiator troubles are with us again. Why not definitely eliminate all Ford radiator damage by the use of JAFEE radiators? JAFEE is the only radiator in the world which not only carries an ironclad guarantee against freezing injuries with free replacement in case of such trouble, but also has \$100.00 reward waiting for anyone whose JAFEE core is so damaged.

DEALERS The JAFEE \$100.00 Reward Guarantee has a wonderful appeal for your customers. It puts in your hands the greatest selling feature ever offered the trade. It means big JAFEE sales for you. Are you equipped to take care of the demand? Your jobber can supply you. Write us for your nearest shipping point.

Also if you will just tear out this page and mail it to us, we will gladly forward to you some of our new three-color display signs, imprinted with your own name and address. *They will bring you business.*

JAFEE—"The Nationally Advertised Radiator with the \$100.00 Reward."

JAFEE RADIATOR COMPANY
741 W. Van Buren St., Chicago, Illinois

FACE THE FACTS

New business methods are required to meet new business conditions

Old methods invite failure

This merchant is trying to meet present-day conditions with an out-of-date store system.

- ① He can't get the records he needs.
- ② He guesses about the amount of outstanding accounts.
- ③ His customers get slow service.
- ④ He gives no receipt to his customers.
- ⑤ There is no incentive for his clerks to do better work.
- ⑥ He hasn't been able to reduce expenses.

He complains about conditions.

He is discouraged. He fears failure



WE MAKE CASH REGISTERS FOR EVERY LINE OF BUSINESS. NOW PRICED AS LOW AS \$75 ^{IN U.S.A.}

NATIONAL

CASH REGISTER COMPANY-DAYTON-OHIO

FACE THE FACTS

New model National Cash Registers help merchants meet new conditions

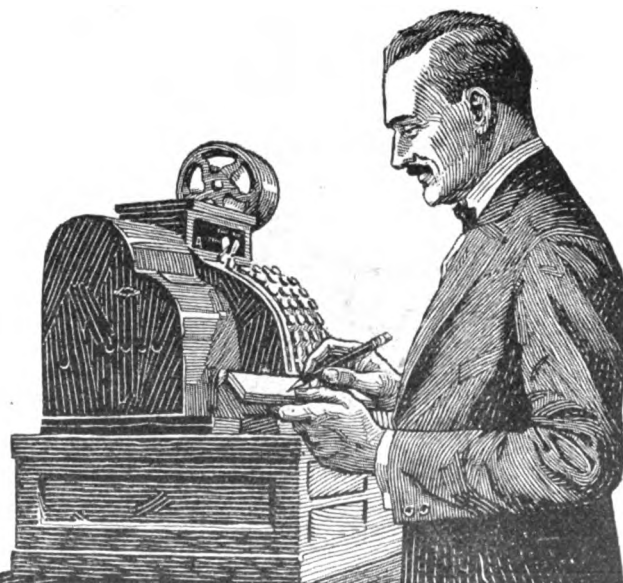
New methods insure success

This merchant has installed a new model National Cash Register especially designed to help merchants meet new conditions.

- ① It gives facts necessary for managing his business.
- ② It provides an easy way to keep tax records.
- ③ It gives quick, accurate service to customers.
- ④ It prints a receipt for each customer.
- ⑤ It helps clerks sell more goods.
- ⑥ It reduces overhead.

He has made conditions in his store right.
He is meeting present-day conditions successfully.

A National Cash Register is the only machine that issues a receipt, indicates, adds, prints, classifies, and distributes records *at the time of the sale*, all in one operation. No figure work. No delays. No mistakes. Just read the totals.



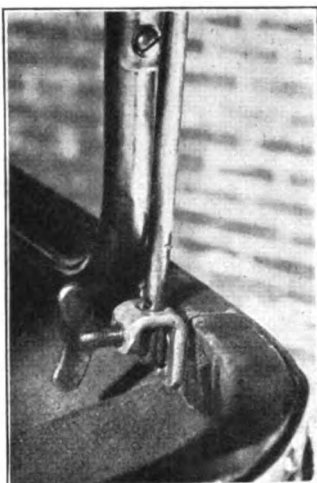
WE MAKE CASH REGISTERS FOR EVERY LINE OF BUSINESS. NOW PRICED AS LOW AS \$75 IN U.S.A.

NATIONAL

CASH REGISTER COMPANY-DAYTON-OHIO

Ford touring cars. The business in this line has assumed a tremendous volume, not only as an overhauling feature but as a replacement proposition on brand new cars.

The idea of replacing the original top is appealing strongly to thousands of Ford



Attached Inside Front Bow.

owners who seem quite willing to spend the modest sum involved for a new top.

It is difficult to imagine any one change that could be made for so small a sum with so gratifying a result. Aside from the improved appearance, the ease of operating such a top needs no argument. The one-man top construction has been basically sound, as is proved by its widespread adoption on every other make of car.

The American Forging & Socket Co. has been experiencing such a demand for bow sockets, to be used in the construction of Ford tops, that it has brought out a special outfit designed for this purpose.

This outfit consists not only of the bow sockets but, what is almost as important, the necessary windshield attachments to serve as a top support and hold down the clamp. These are a part of the standard outfit which they are putting out.

By way of description, it is explained



Outfit Includes Windshield Attachments.

that the set is comprised of two principal parts which are, of course, duplicated as they have to be attached to both the right and left sides of the windshield.

Each half of the set consists of an up-

right rod, which is attached to the Ford windshield hinge (lower half) by simply removing with a screwdriver the two screws used to assemble this part to the windshield frame, placing the upright in position and replacing the screws.

The other member consists of a clamp-shaped device, provided with a thumb-screw which is attached to the inside of the front or outrigger bow of the top by means of the large wood screws furnished with the outfit.

With these two parts in position, as described, all that is necessary is to bring down the forward bow, thus bringing the clamps attached to the bow down over the upper ends of the uprights attached to the windshield, and tightening up the thumb-screws, firmly holding the top in position.

The bow sockets are so well-known as not to require any special discussion. The windshield top supports are made from dropped forgings and heavy formed stampings, no castings of any kind being used in their construction. The entire outfit is hand-somely finished with two coats of baked black enamel. They are substantially packed in compact cases, but, in addition to this, the windshield clamping device may be purchased independently.

Where these top-supporting devices are employed, it is said to be impossible for the front of the top to become unfastened and the constant danger of the forward portion of the top collapsing is eliminated where they are installed.

The American Forging & Socket Co., Pontiac, Mich., will be glad to send descriptive literature to any dealer desiring information regarding the top outfit or the windshield attachments.

Practical Service Proves Quality of New Daleco Timer.

For several months past the Dale Mfg. company has been quietly putting on the market the Daleco timer, thus proving its quality by practical service under all conditions.

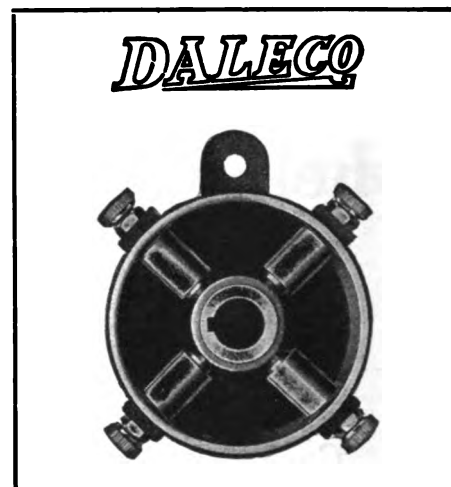
The outstanding features of the Daleco are: A Bakelite case of evidently strong design; a true circular rotor of specially made fiber with a copper insert contact; and an all brass electrical circuit.

The distribution units are set radially in the case, and timing is in no way affected by either wobble or sidewise movement of the timer shaft, it is said.

No lubrication is required and, should grease or oil working through the camshaft bearing cover the rotor, the oil film is instantly broken by the wipe contact and quick starting is assured no matter how cold the weather, says the manufacturer.

The material and construction are of the best.

Distribution to the trade is being made through the Zinke Mfg. Co. of 1329 Mich-



Daleco Has Bakelite Case of Strong Design-
igan Ave., Chicago, Ill., which is acting as the sales department of the Dale Mfg. company.

Red Spot Easily Attached But Locks Securely.

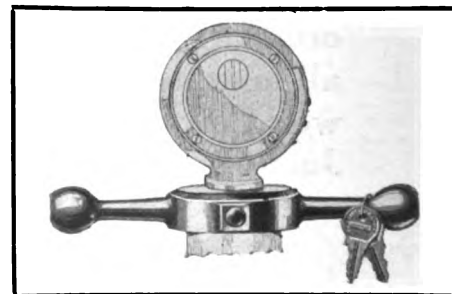
One of the most useful of the simpler devices offered to the car owner is the Red Spot radiator and cap lock.

Radiator devices invite the petty thief, because they are easily and quickly removed and easily disposed of.

The Red Spot radiator and cap lock, which is said to embody all the desirable features for such an accessory, combines protection with the ornamental purpose.

It is exceptionally well made, of solid nickel silver which will not rust or corrode and takes a high polish. It is easily attached but practically impossible to remove when locked.

The lock is of the highest grade cylinder type, with a keyhole at the end of the graceful bar. The bar locks square to the front, and stays in perfect alignment. It



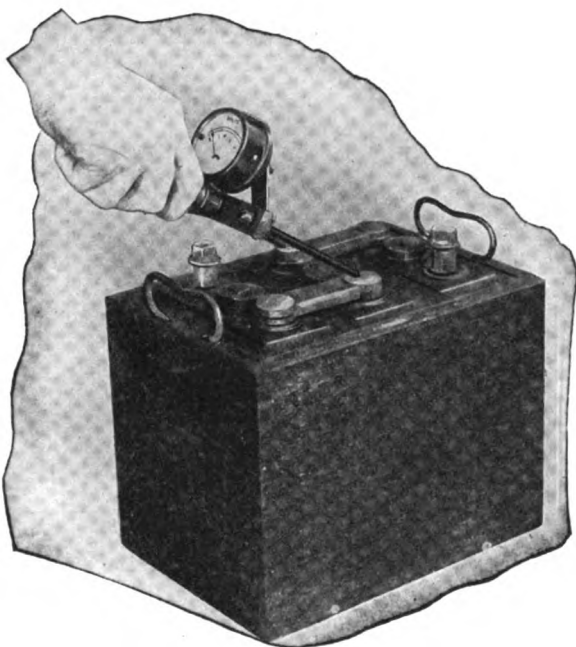
Red Spot Radiator and Cap Lock.

is locked by a quarter turn of the key; one quarter turn of the bar removing cap.

The Red Spot is manufactured by the W. A. Hanna Co., Chicago, who have planned an advertising campaign of considerable proportions for merchandising the product.

BATTERY SERVICE MEN

Get Big Returns from a Very Small Investment When They Use This "Weak Cell" Detector



THE STERLING NO. 600 HIGH RATE DISCHARGE CELL TESTER is a real storage battery "Trouble Shooter". Five minutes instruction will enable any mechanic to get the full benefit of its use.

It provides an accurate, reliable means of testing the performance of a storage battery under discharge, without removing the battery from the car.

It instantly locates defective cells which are in need of attention.

PRICE 8.00

Write for Bulletin 10-3.

A BOON TO FORD SERVICE MEN

A High Grade MAGNETO METER At LOW Price At Last

No 700 Magneto Meter



The **STERLING NO. 700 MAGNETO METER** is intended for just one purpose. Any mechanic can use it. No danger of putting it out of commission. Connections made with patented one hand double contact device. Tests simple. No experience necessary. Results accurate and automatically indicated. Write for Bulletin 19-3.

Just What You Have Been Looking For.

PRICE 8.50

Insist on having the **STERLING**. If your jobber does not handle it, send your order direct to us, stating the name of your jobber.

Manufactured by
THE STERLING MANUFACTURING CO.
2849 Prospect Ave. Cleveland, Ohio

Largest Producers of Dash Ammeters in the World



Fix 'em up

When the gas tank springs a leak or any other part of the car needs soldering you can fix it "for keeps" and in jig time with



It's so easy to solder the Kester way. No acid to bother with—this solder supplies its own acid which feeds with the solder in just the right proportion. And you get a perfect, lasting joint every time—no resoldering. It's no wonder repairmen who know Kester will use nothing else.

Are you acquainted? No? Then shoot in the coupon and get the proof.

CHICAGO SOLDER COMPANY

4210 Wrightwood Ave., Chicago, Ill.

CHICAGO SOLDER CO.,
4210 Wrightwood Ave., Chicago.

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

Company

Address

City..... State.....

Our Supply House Is.....

Up-to-the-Minute Garage Equipment

Let a Boe Three-Way Pump Help You—It's Self-Measuring.

"It's money in your pocket to invest in a Boe Three-Way Valveless grease bucket," said the Salesman-Who-Knew-His-Goods to the Garageman-Who-Is-Always-Looking-For-The-Best-In-Equipment. "Here are a few of the arguments in its favor—and you can't beat 'em!"

"First, it will pump the old grease out of the gear cases and pump clean grease into them.

"It is equipped with accurate, adjustable measuring means, graduated to $\frac{1}{2}$ -pound or $\frac{1}{2}$ -pint.

"The Three-Way pumps gear lubricant out of the bucket or into it. Other gear lubricant is handled and measured without disturbing the contents in the bucket, and the entire pump is complete and instantly interchangeable from one bucket into another.

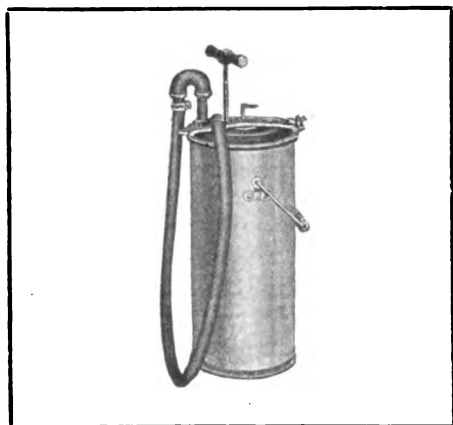
"The entire lower end of the pump cylinder is wide open for the intake stroke, but positively closes on the discharge stroke.

"You will notice, also, that the Three-Way has the patented, expanding, spring-cup, leak-proof plunger construction, making this an unusually powerful pump.

"The pump is equipped with a vertically suspended discharge hose with tapered, ell-shaped nozzle, and it will handle lubricant up to such consistency as will barely flow or gravitate.

"Another important feature is that, in case such foreign matter as waste, etc., should get mixed with the grease in the bucket and choke up the intake opening, the operator can simply lift the pump out of the bucket and remove the obstruction.

"And these are the features which make



Boe Three-Way Pump Is Self Measuring.

the Three-Way pump a real investment—a piece of equipment that will start the dollars rolling into your garage."

"You said it," replied the Garageman-Who-Is-Always-Looking-For-The-Best-In-

Equipment. "I can see that it's the pump for my shop."

You will want to know more about this efficient new pump. The Boe Mfg. Co., Minneapolis, Minn., will gladly forward full details upon request.

Correct! Of Course. He Tests with a Sterling Magneto Meter.

Realizing the need for an instrument which would rapidly and easily test the Ford magneto and one which, at the same time, would be inexpensive and durable, the Sterling Mfg. Co. has perfected the Sterling No. 700 magneto meter which, it is said, meets all these requirements.

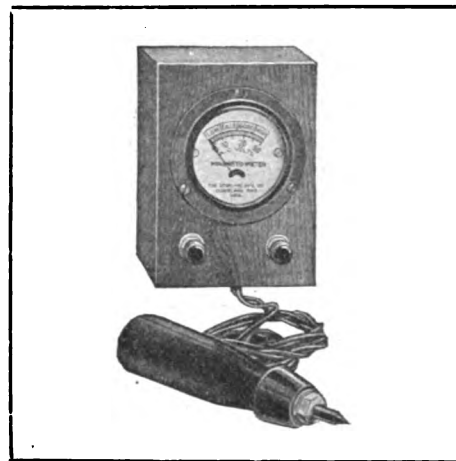
All the experience and knowledge gained in a number of years of instrument building, and in the production of over a million Sterling ammeters now in use as standard equipment on prominent makes of American motor cars, was utilized. The result is the Sterling No. 700 magneto meter, an alternating current instrument designed especially for the testing of low tension magnetos.

The Sterling magneto meter, however, is not merely a meter. It is a very complete and accurate testing unit. The voltmeter, which is of the same size and general appearance as the Sterling 500 series of direct current ammeters and voltmeters, is mounted in a neat, strong, well-finished wooden box which serves as a carrying case and protects the instrument from injury. The terminal connections are brought out from the inside of the box to two hard rubber binding posts on the face of the instrument case, to provide an easy method of making permanent connections between the meter and the magneto under test.

In addition, a special connection is provided for making rapid tests on Ford magnetos. For this purpose, a special two-foot flexible cable of insulated silk cord, connected directly to the instrument, leaves the wooden case through a bushed opening in the lower end. At the other end of this cable is a specially-designed terminal, consisting of a wooden handle with two metal contacts at the bottom. These contacts are insulated from each other and so spaced that when the upper contact or sleeve is placed against the magneto terminal located on the top of the Ford transmission case the lower terminal or prod will rest upon the transmission case itself and form a ground connection at that point.

The magneto meter itself is a very accurate alternating current voltmeter, so calibrated as to read the voltage or pres-

sure developed by the low tension magneto. The lower or numerical scale reads directly in volts, and has a range of 0.30 volts, which is ample for testing the volt-



Designed for Testing Low Tension Magnetos.

age performance of Ford and other types of low tension magnetos.

In addition to the numerical scale, a lettered guide scale is also provided, which divides the numerical scale into four sections marked respectively, "Low," "Fair," "Good," and "High," which guide scale is provided especially for classifying the performance of Ford magnetos, and which automatically explains the condition of a Ford magneto whenever it is placed under test.

The low price, the convenient and simple method of application, and the easy and accurate interpretation of results without the necessity of using expensive precision instruments, all combine to make the Sterling magneto meter a particularly valuable and desirable instrument for the repairshop which handles automotive electrical repairs.

Write the Sterling Mfg. Co., 2849 Prospect Avenue, Cleveland, Ohio, for complete details.

"I Want Frankel Clips!" Said the Dealer—Read Why.

What was more natural than that the Frankel Connector Co., Inc., of 25-27 Vestry St., New York City, should engage in the manufacture of battery charging and testing clips? For many years, the Frankel Connector company has specialized on testing clips, which have had a very wide and popular sale, particularly in the electrical industry where they are now being used by telephone companies, central stations and power companies.

It is admitted that the Frankel Connector company is one of the largest and best

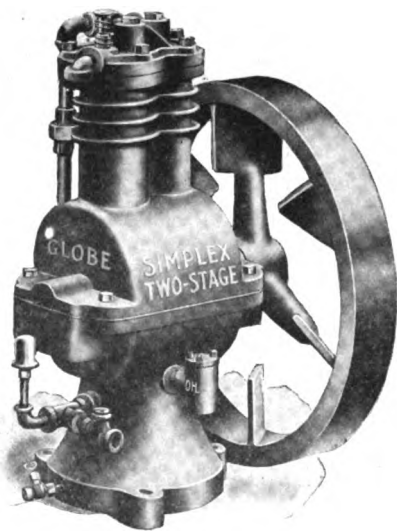
There He Goes--

Another good customer lost because the old compressor has fallen down on the job just when he wanted his tires filled—

Well, you don't *have* to let him go

You know perfectly well that a dependable free air supply is your best advertisement. The only way to keep your old customers and make new ones is to have a compressor which is on the job **ALL THE TIME.**

Here it is



GLOBE SIMPLEX TWO-STAGE

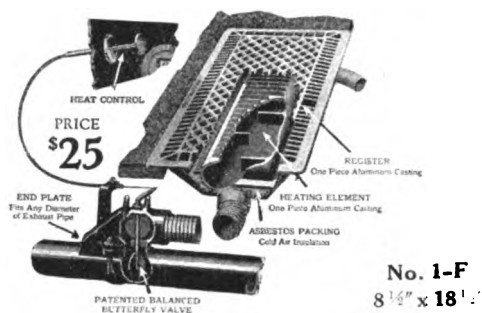
A New TYPE Compressor just put on the market after four years of observation in actual service. The most practical and dependable compressor you can buy, at a price which will surprise you.

No need to install a cheap, single-stage outfit now—You can have the **BEST Two-Stage** at the same price.

DON'T WAIT — PRICES WILL NEVER BE LOWER—BUY NOW and **hold your trade through the winter months** instead of complaining of poor business.

GLOBE MANUFACTURING CO.
Battle Creek, Mich.

New Winter Profits for You



CHANSON Car Heaters

One Valve Fits All Sizes of Exhaust Pipes

Here is your opportunity to make some profits this winter that you hadn't figured on.

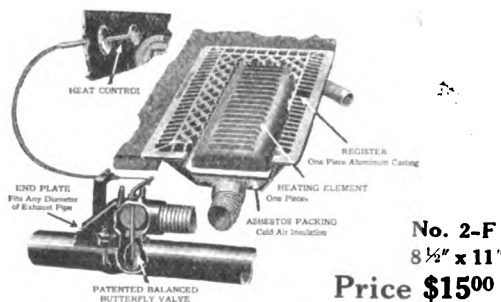
Chanson flush type and foot rail Car Heaters have made it possible for you to equip any car that is driven into your shop with a more satisfactory heater than you have ever had before.

The Chanson Patented Balanced Butterfly Valve with which both types of heaters are equipped is furnished with two sets of end plates that fit all sizes of exhaust pipes. You do not have to stock a variety of sizes for installation on different makes of cars.

Chanson Car Heaters begin heating the minute the engine starts running. Asbestos packing prevents cold air cooling the heating unit while running in cold weather. Heat in the car is instantaneously regulated to suit comfort of occupants.

This is the year to sell Chanson Car Heaters. More winter tops are coming into use every year. To be wholly comfortable a passenger car must be heated. Touring cars without winter tops can be made very comfortable with Chanson heaters also. Be ready to fit them all—with Chanson Car Heaters.

Write for full particulars today, including information about advertising helps.



CHANNON-HUGHSON CO.
227 West Erie Street Chicago, Illinois

equipped of the manufacturers in the United States which specialize on testing clips. Having seen the need and the demand for an efficient battery charging and testing clip, their engineers have perfected what is said to be the most modern type of battery charging and testing clip now on the market.

Frankel quality has always been an assurance of satisfaction to Frankel customers. Hence, the company assures that its latest clip, known as the Frankel battery charging clip, is made of the very best grade of materials.

One of the obvious—and yet most important—features of the Frankel battery charging clip is that it is substantially constructed, with a very strong spring which will give a good contact at all times under all sorts of conditions.

Another meritorious and appreciated feature is that the Frankel battery charging clip is quickly adjustable and can be used for rigging up either a screw or hook, no soldering being required.

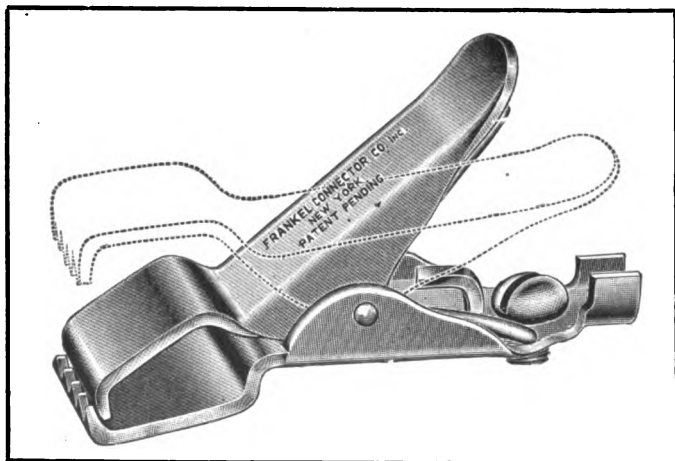
Note the spread of the jaws which, when fully extended, have a spread of 1½ inches.

These clips are heavily lead plated, which insures satisfactory service and the longest possible kind of life.

For the service requirements of any garage, repairshop or service station, the Frankel battery charging and testing clip will give service which will never fail to please.

H. F. Frankel, president of the Frankel Connector company, advises that preparations are being made to produce large quantities of these battery charging clips during 1922, so that early deliveries can be promised even now.

Despite the very high and evident qual-



Frankel Battery Charging Clip Is Quickly Adjustable.

ity of the Frankel battery charging clip, the large production which is contemplated for them makes possible their very low prices, quotations for which will be gladly submitted upon request. Inquiries for prices and descriptive literature should be addressed to the Frankel Connector Co., Inc., 25-27 Vestry St., New York, N. Y.

Battery Stations Find Polarstil and Steamer Practical and Convenient.

"When we look back on the 'make-shift' steamers and stills that we bought on equally as strong claims as you make, we wonder how long they will continue to sell after the merit of your practical machine becomes better known." Thus wrote a delighted purchaser of a Polarstil and steamer. This is the exceedingly practical combination of pressure boiler and water still which is being offered for battery station use by the Jewell Polar Co., 565 T. W. Van Buren St., Chicago.

In fact the Polarstil and steamer will be found useful wherever steam under moderate pressure and distilled water in limited amount are required for any particular purpose. It will furnish steam up to ten pounds pressure for cooking, drying, sterilizing, softening, etc. Or the steam may be converted in chemically pure distilled water for drinking, chemical, pharmaceutical, surgical, storage battery and other purposes.

Originally designed to furnish the storage battery repair station with a sturdy device that would "stand the gaff" of continuous hard use, it is finding its way into other service and is establishing an excellent reputation for service along with other Polar products.

The boiler is a substantial pressure tank, tested to 100 pounds hydrostatic pressure and covered with a jacket of copper. Insulation between the boiler and its jacket to insure economical evaporation. A pop safety valve, set to blow off at ten pounds insures perfect safety.

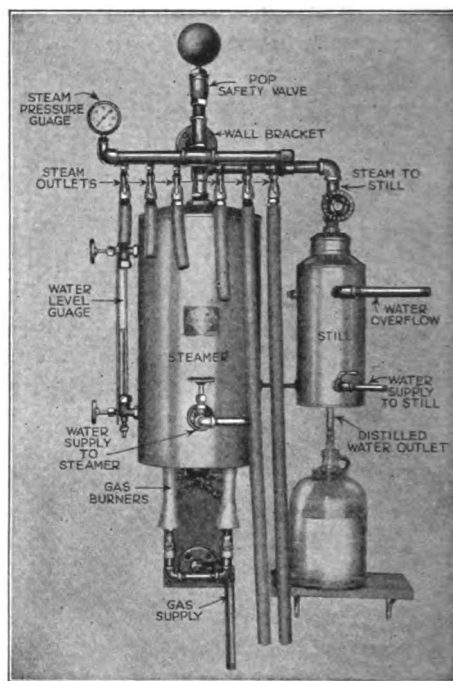
The still is a Polarstil, in reduced size, but within its capacity of one to two gallons of distilled water per hour, it is equal to any of our large plants, recognized by engineers, chemists, etc., as an exceptionally satisfactory water distilling system. It is made of copper with pure block tin interiors and is provided with a vent for gases and odors.

A steady pressure of from two to ten pounds can be maintained by the boiler, depending upon the number of petcocks open to service. By opening the valve in the line to the still, and the water supply to the still, the vapor is converted into pure distilled water. The outfit may be operated continuously by occasionally replenishing the water in the boiler. It is easily cleaned by "blowing down."

The entire outfit is compact and self-contained. It is provided with a unique

wall bracket so that it may be mounted on the wall above a bench, out of the way, and yet be convenient. Its copper surfaces make it a handsome apparatus which, combined with its usefulness, soon make it a valuable part of any equipment.

The Polarstil and steamer can be sup-



Polarstil and Steamer Gives Real Service.

plied for operation by either gas, kerosene or gasoline.

Those interested may obtain complete details regarding the Polarstil and steamer by writing the manufacturer at the Chicago address given in the first paragraph.

Battery Tests Prove Value of New Plate Material.

In a series of tests conducted by the Electrical Testing Laboratories recently and observed by notable men in the automotive field, a Ray storage battery showed its ability to stand up under severe charge and discharge conditions, by coming out with plates practically unharmed, while batteries in competition showed softening or partial disintegration of the active material.

In addition, a Ray was discharged with wire nails used instead of separators to show its ability to stand up under the 100-ampere rate until the voltage was zero. The tests were handled by the men of the laboratory with batteries purchased from dealers in New York City.

Observers included a representative of the contest board of the American Automobile Association, H. A. Tarantous of Motor, William Garity of the DeForrest Telephone & Telegraph Co., battery men, newspaper representatives and others who were invited openly through advertising.

The tests covered two days. On the first day each battery was in turn discharged at



Bent or Twisted Connecting Rods

*Straightened
with the*

FORT HILL Aligning Gauge

Operates with
one arbor for
all types and
sizes.



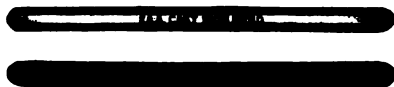
75 percent of all troubles
with motors that have
been reground and re-
assembled is due to bent
or twisted connecting
rods.

THE DYER COMPANY
Makers of Garage Equipment
155 Brookline St.
Cambridge, - Mass.

Dealers - Jobbers - Distributors

F. A. A. CAST IRON & ALUMINUM MENDS

Are in Demand Everywhere



Use F. A. A. MENDS in repairing scored
Cylinders, Cracked Water Jackets and
Aluminum Crank Cases. They give a solid
and permanent result, that is associated
with scientific welding.

When you are troubled with a Scored
Cylinder, Cracked Water Jacket or Alumi-
num Crank Case, have it repaired with in-
comparable F. A. A. MENDS.

It achieves more and costs less than any other.

Give these MENDS a trial or ship your
CYLINDERS or CRANK CASES direct to
us—they will be returned the same day
received.

NO REGRINDING, NO NEW PISTONS,
NO WARPING or CRACKING.

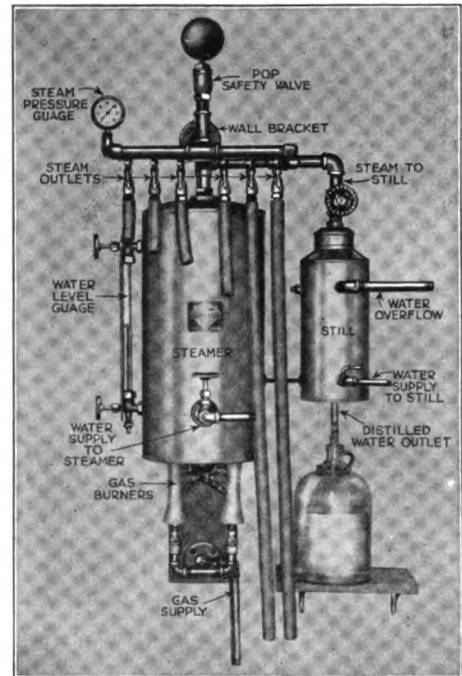
Let us send full particulars—Write today.

F. A. ALBERTUS & CO.

206 Ninth St.

Milwaukee, Wis.

"BUILT TO STAND THE GAFF"



Boiler capacity 2-10 lbs. pressure according to
number of lines in use.

Safety valve set at 10 lbs.

Still capacity, 1 to 2 gals. Chemically Pure Dis-
tilled Water Per Hr.

Dimensions, 47x24x18 inches.

Shipping Weight 100 lbs.

Size No. 151 is equipped with Gasoline or
Kerosene Burners.

The Polarstil and Steamer

Is all that it looks—A sturdy, safe and practical
boiler and water still, built by a concern with a
world wide reputation. Our products are recom-
mended by Engineers and Chemists everywhere.

The boiler is tested to 100 lbs. hydrostatic pres-
sure and safety valve pops at 10 lbs. Tank is in-
sulated and covered with copper jacket. The
water still is a POLARSTIL—copper with pure
block tin interiors.

Comes to you complete with wall bracket and
all ready for simple water and gas connections.

You owe it to your business.

Write for Literature.

JEWELL POLAR CO.

565 T. W. Van Buren St.

CHICAGO, ILL.

Use COUPON BOOKS

**They Encourage Sales--
Place Your Business on a Cash Basis**

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

In place of a multitude of petty transactions involving endless bookkeeping is substituted a simple, self-regulating system, so easy to grasp that the most ignorant patron cannot complain nor the most careless employe make mistakes. A coupon book has no value until issued, countersigned and dated. If lost or stolen it has no value.

The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

Southern Coupon Co.
Box 1472 Birmingham, Ala.

300 amperes for one minute and thereafter at 100 amperes until the cell voltage equalled zero.

In this test the Ray held up for 31 minutes before dropping off to zero. The nearest competitor lasted 24 minutes; the next two 21 minutes; the next, six minutes. After this test, the batteries were connected in series and charged at the highly excessive rate of 100 amperes for the first hour and at 25 amperes for the next 16 hours. After taking off of charge, the batteries were again put through discharge tests.

In this the Ray started out at 200 amperes for one minute and showed 100 amperes for the succeeding four minutes. One competitor showed 200 amperes for two

minutes and then dropped to 100 amperes, gradually falling off through a period of 20 minutes total to zero voltage.

A third battery started at 200 amperes and in six minutes held a 100-ampere discharge before showing zero voltage. Another storage battery could show only 50 amperes at the start and it lasted but three minutes.

The tests showed that the Ray battery-plate material could withstand a greater degree of punishment than any of the competing batteries because all the others came through with softened active material, or else the material was partially out of the grids.

The batteries were of the 6-volt, 11-plate

type with the exception of one battery, which was of the 6-volt, 13-plate type.

Endurance, Economy and Price Considered by Car Owners.

A bulletin recently issued by the National Automobile Chamber of Commerce states that an analysis by groups of returns from a questionnaire to car owners shows that through all price ranges and in all sections of the country endurance, economy and price are leading considerations.

Comfort is second to endurance in the middle-priced car-owning group and in the group owning cars above \$3,000 in price. Endurance received considerably more votes, however, in both of these divisions.

The man who owns a car priced under \$500 gives first consideration to economy, second to price, third to endurance, and fourth to service, showing logically that he is in the field for transportation at an absolutely minimum cost.

Service is rated as of fourth and fifth importance in the Rocky Mountain and Pacific Coast sections. Hill climbing is considered relatively unimportant but is fifth in demand for cars costing above \$3,000.

In fact the analysis of the 10 per cent coincided with that of the first 5 per cent analyzed, seeming to indicate a general uniformity in the opinion of the average car owner at the present time.

A higher percentage of replies was received from the middle and higher-priced car owners than might be expected from their relative percentage among all owners. Only one-tenth of the replies were from persons owning cars valued at under \$500.

The relative position and percentage of votes received by the various factors in the general average follow:

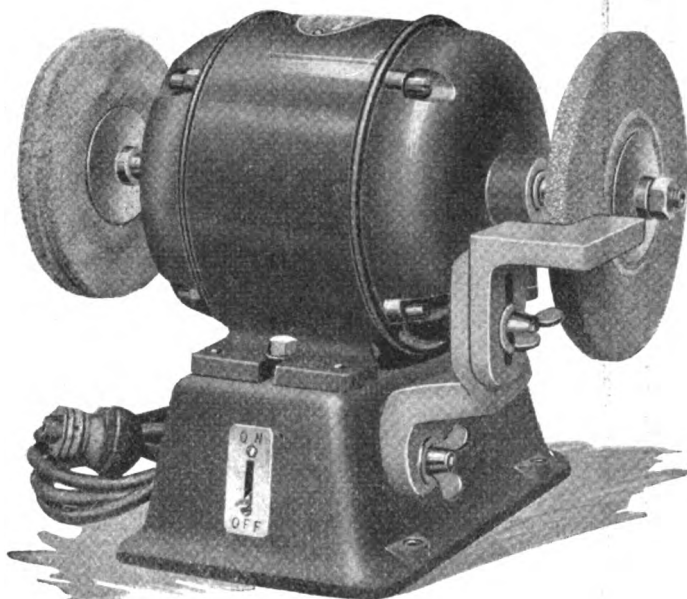
	Per Cent
Endurance	15
Economy	14
Comfort	9½
Price	9½
Appearance	8
Service (good local repairs shops)	7½
Hill climbing	7
Flexibility	6½
Endorsement (opinion of other owners)	6½
Specifications	6
Speed	5½
Appointments	5

Tabulated votes for the various classifications follow:

Cars Under \$500	Per Cent
1. Economy	17
2. Price	16
3. Endurance	15½
4. Service	11
5. Comfort	9
6. Appearance	7
7. Hill Climbing	6
8. Flexibility	5
9. Endorsements	5

MARATHON "OK" \$25.00 Electric Grinder and Buffer

COMPLETE WITH MOTOR



A wonderfully handy tool for every garage or home workshop.

Has 6 inch carborundum wheel on one end of spindle, and 6 inch buffer on the other.

Use it for sharpening tools and miscellaneous grinding work. Buffer is fine for polishing nicked, silver and brass parts.

Driven by $\frac{1}{4}$ hp., Marathon O K Single Phase alternating current motor. Speed 1740 rpm.

Dealers: Install one or more in your own workshop, and offer them for sale to car owners at \$45.00 to \$50.00. A low price for an outfit of this size and capacity.

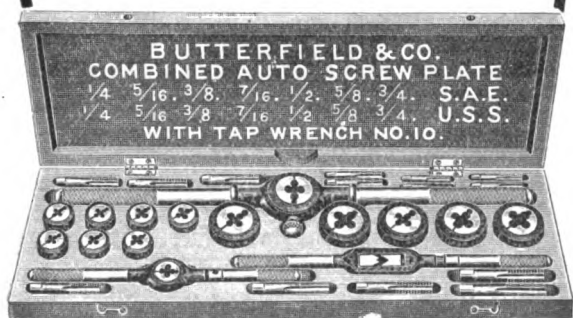
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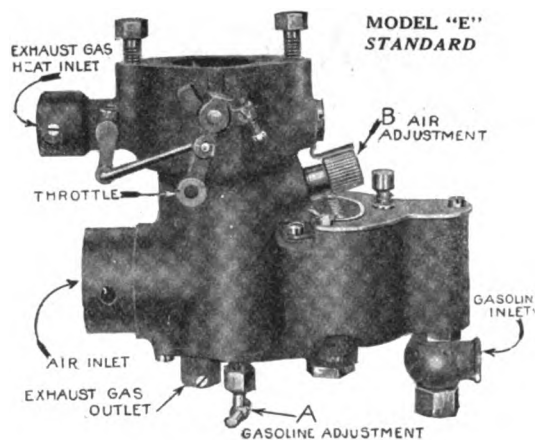
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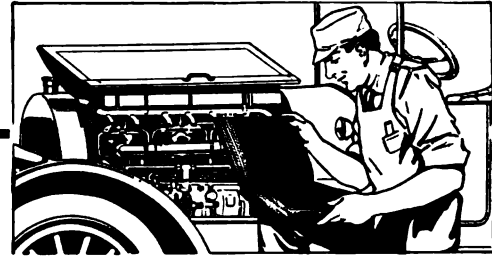
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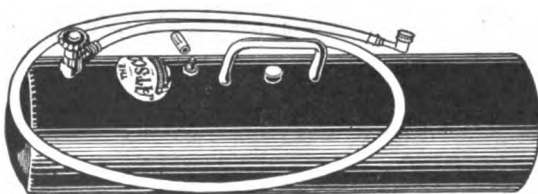
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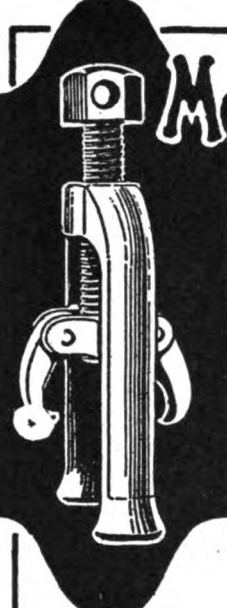
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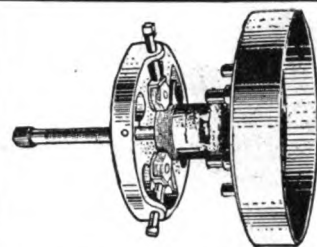
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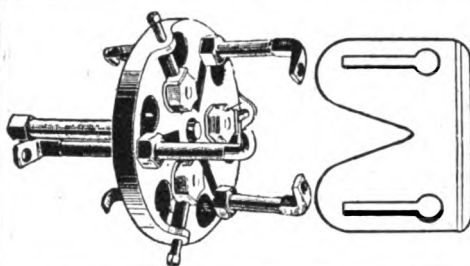


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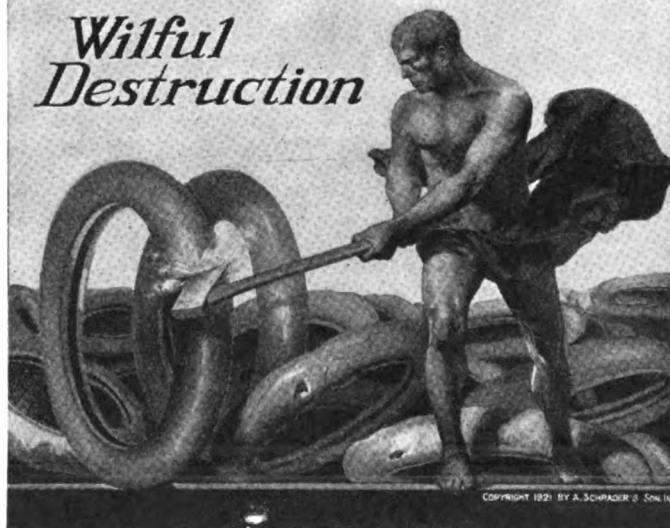
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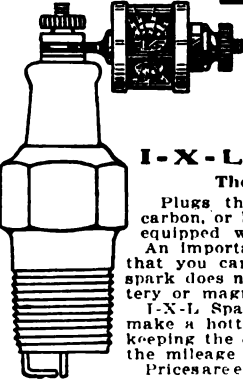
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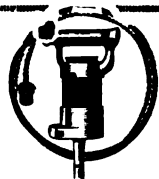
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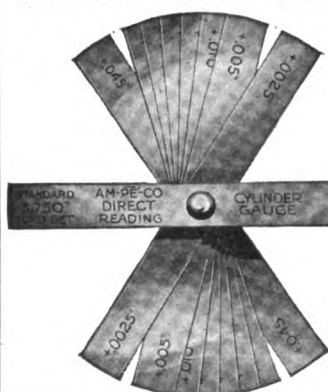
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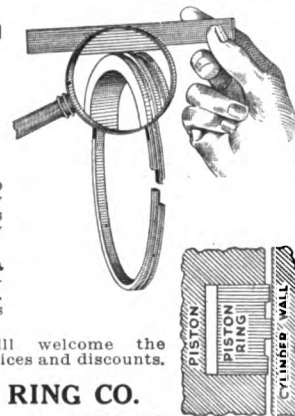
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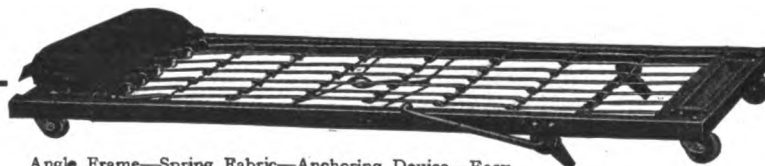
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Index to Advertisements

A		J	
Air-Tight Steel Tank Co.	56	Jaffe Radiator Co.	45
Albertus & Co., F. A.	53	Jenkins Vulcan Springs Co.	—
American Bolt & Screw Case Co.	—	Jewell Polar Co.	53
Am-pe-co Sales Co.	61	K	
Atlas Auto Supply Co.	—	Kennedy Car Liner & Bag Co.	63
Auto Specialties Mfg. Co.	5	Krasberg Piston Ring Co.	59, 61
Automotive Publ. Co.	56	L	
B		Laminated Shim Co.	58
Ballou Co., Geo. D.	—	Leich Electric Co.	4
Benson Co., Alex. R.	58	Lewis & Milligan	57
Boddy, J. Newton	57	Loudon, Inc.	—
Boe Mfg. Co.	58	M	
Boissonnault Co., Inc., G.	61	McDaniel Contracting and Engineering Co., Leo.	59
Bowes Co., Robt. M.	59	Magnet Light Co., The	—
Brewer Specialty Corp.	—	Marathon Electric Co.	55
Brunner Mfg. Co.	34	Marvel Carburetor Co.	55
Buffum Tool Co.	57	Marvel Machinery Co.	—
Burd High Compression Ring Co.	59	Metals Repair & Supply Co.	63
Burgess-Norton Mfg. Co.	60	Metal Stamping Co.	63
Butler Mfg. Co.	60	Mikesell Bros. Co.	56
Butterfield & Co.	55	N	
C		National Cash Register Co.	46, 47
Catelain, Andre G.	60	National Refining Co.	39
Champion Pneumatic Machinery Co.	6	New Era Spring & Specialty Co.	—
Channon-Hughson Co.	51	O	
Chicago Solder Co.	49	Oakes, L. E., Sign Co.	60
Clark Co., W. L.	—	P	
Curtis Pneumatic Machinery Co.	41	Paro, H. G., Co.	56
D		Premier Electric Co.	59
Dale Manufacturing Co.	7	R	
Dearborn Equipment & Hinchley-Meyers Co.	—	Reynolds Spring Co.	58
De Mund Sales & Service Co.	84	Romort Mfg. Co.	3
Dickerson, C. A.	56	Rose Mfg. Co., Frank.	58
Drake & Co., Frederick J.	—	R. T. Mfg. & Sales Co.	—
Dunton Co., The M. W.	5	S	
Dyer Co., The.	53	St. Paul Welding & Mfg. Co.	—
E		Sampson Electric Co.	61
Eclipse Valve Grinder Co.	—	Sawyer-Weber Tool Mfg. Co.	—
Essential Automatic Products Co.	33	Schrader's Son, Inc., A.	57
Ever-Tyte Piston Ring Dir.	—	Shaler Co., C. A.	Front Cover
.....Inside Back Cover	—	Southern Coupon Co.	54
F		Standard Accessories Corp.	59
Farmers' National Life Insurance Co.	60	States Chemical Co.	8
Federal Electric Co.	43	Sterling Mfg. Co.	49
Flexume Sign Co.	41	Storm Mfg. Co.	58
Foster Bros. Mfg. Co.	61	T	
G		Taylor, H. D.	Back Cover
Ganschow Co., William.	—	Trindl Co., The.	60
Garden City Spring Works.	61	Tungsten Mfg. Co.	—
General Accessories Corp.	56	Turner Mfg. Co.	Inside Front Cover
Globe Mfg. Co.	51	U	
Grab Co.	—	U. S. Air Compressor Co.	—
Green Engineering Co.	60	Universal Mfg. & Sales Co.	58
Greenfield Tap & Die Corp.	—	V	
Greer College of Motoring.	60	Van Trump-Eselbey Co.	—
H		W	
Herald Printing & Publishing Co.	58	Wagner Specialty Co.	—
Hicken Sed-Tor-Lite Co., B. E.	61	Warshawsky & Co.	60
Hood-Dent Co.	—	Washburn Burner Corp.	—
Hus Kee Tool Mfg. Co.	60	Webber Co., P. H.	6
I		W. H. S. Mfg. Co.	—
Indiana Parts Co.	—	Z	
		Zelnicker Supply Co., Walter A.	—
	Inside Back Cover	—
		Zinke Co.	3, 7, 58

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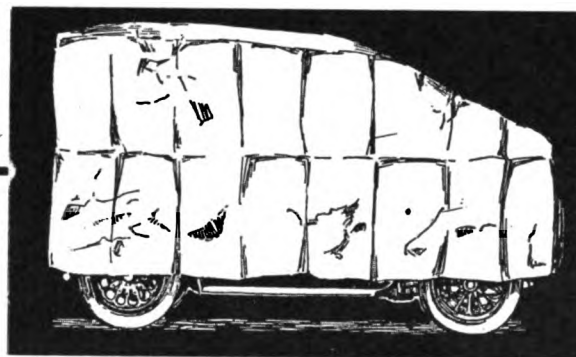
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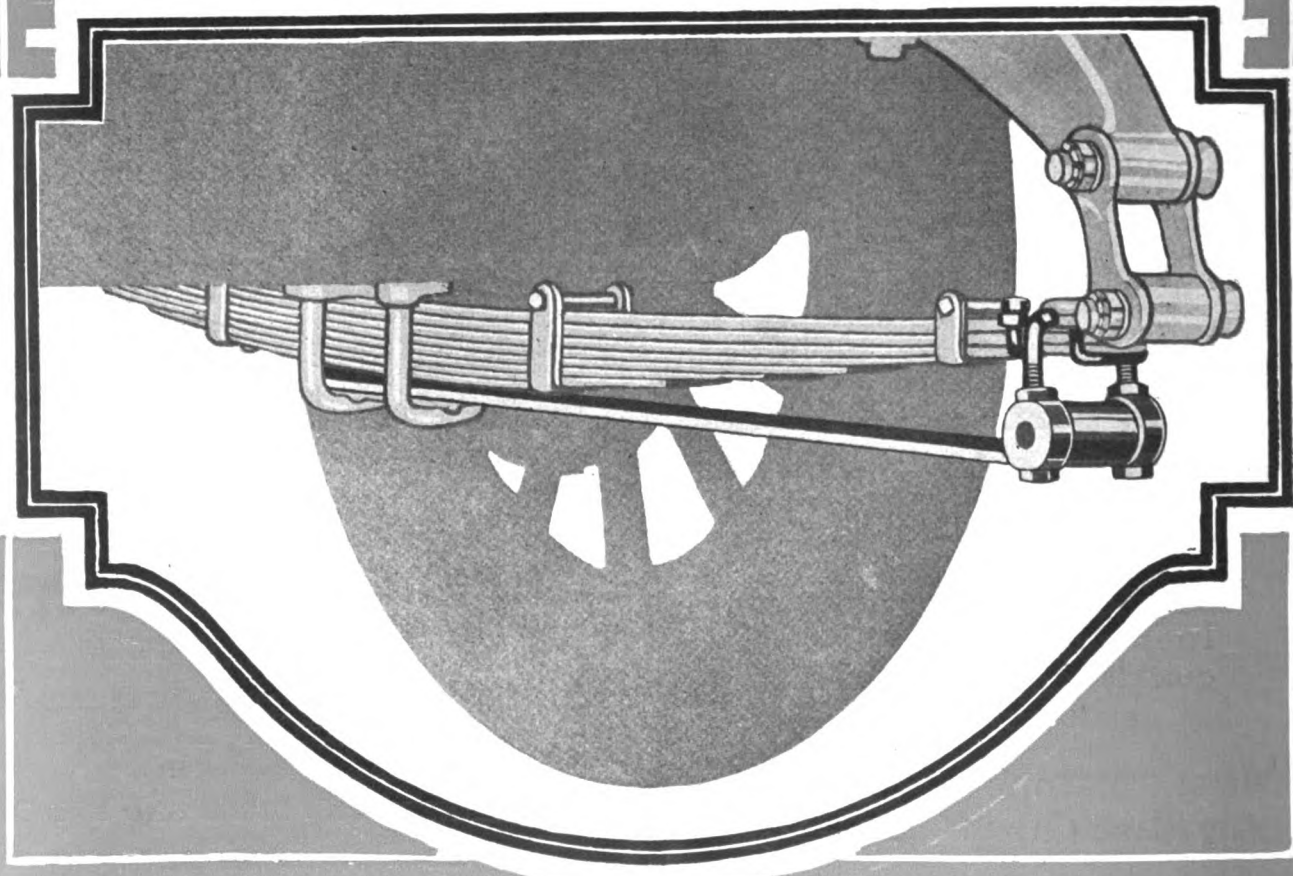
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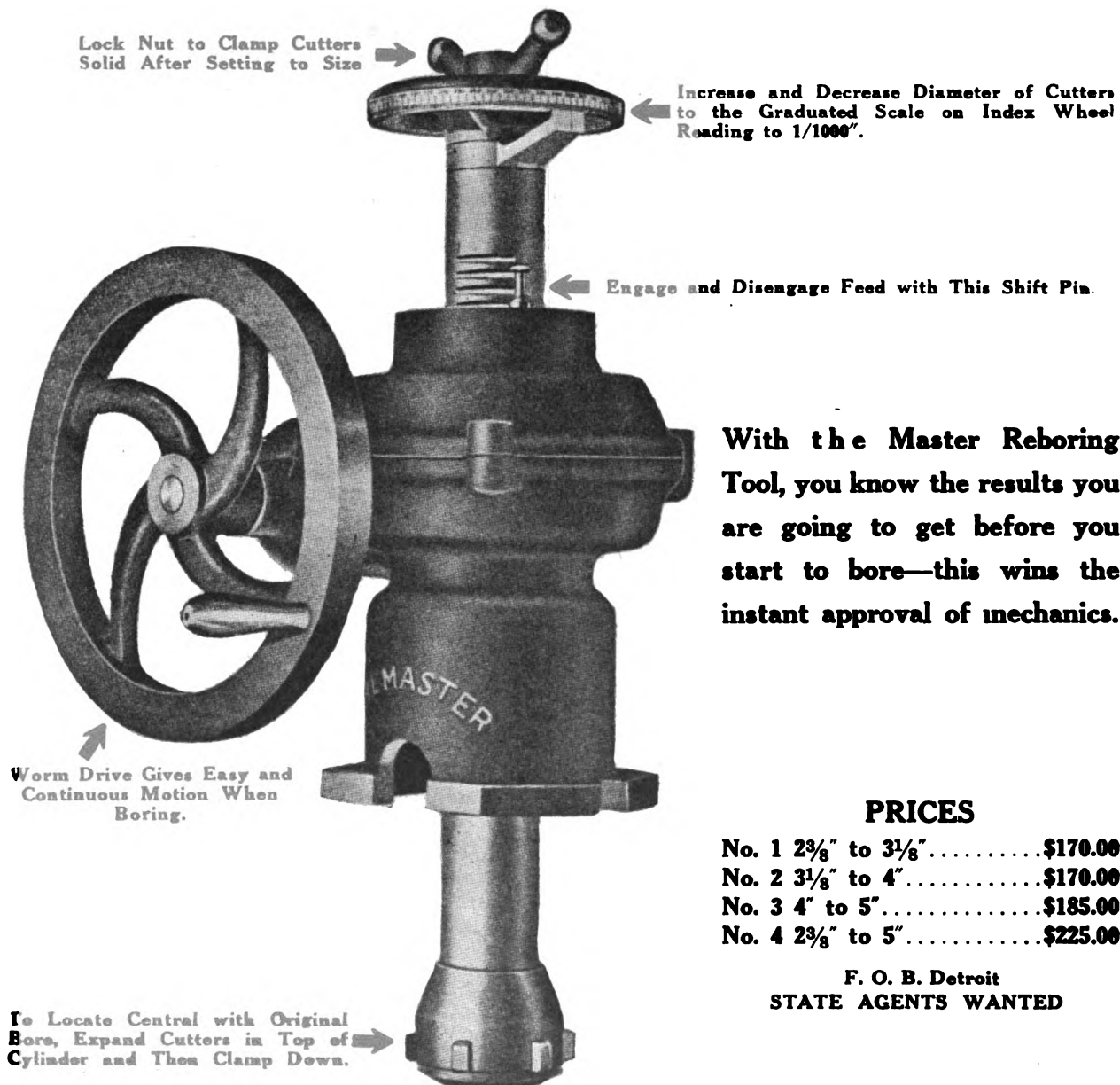
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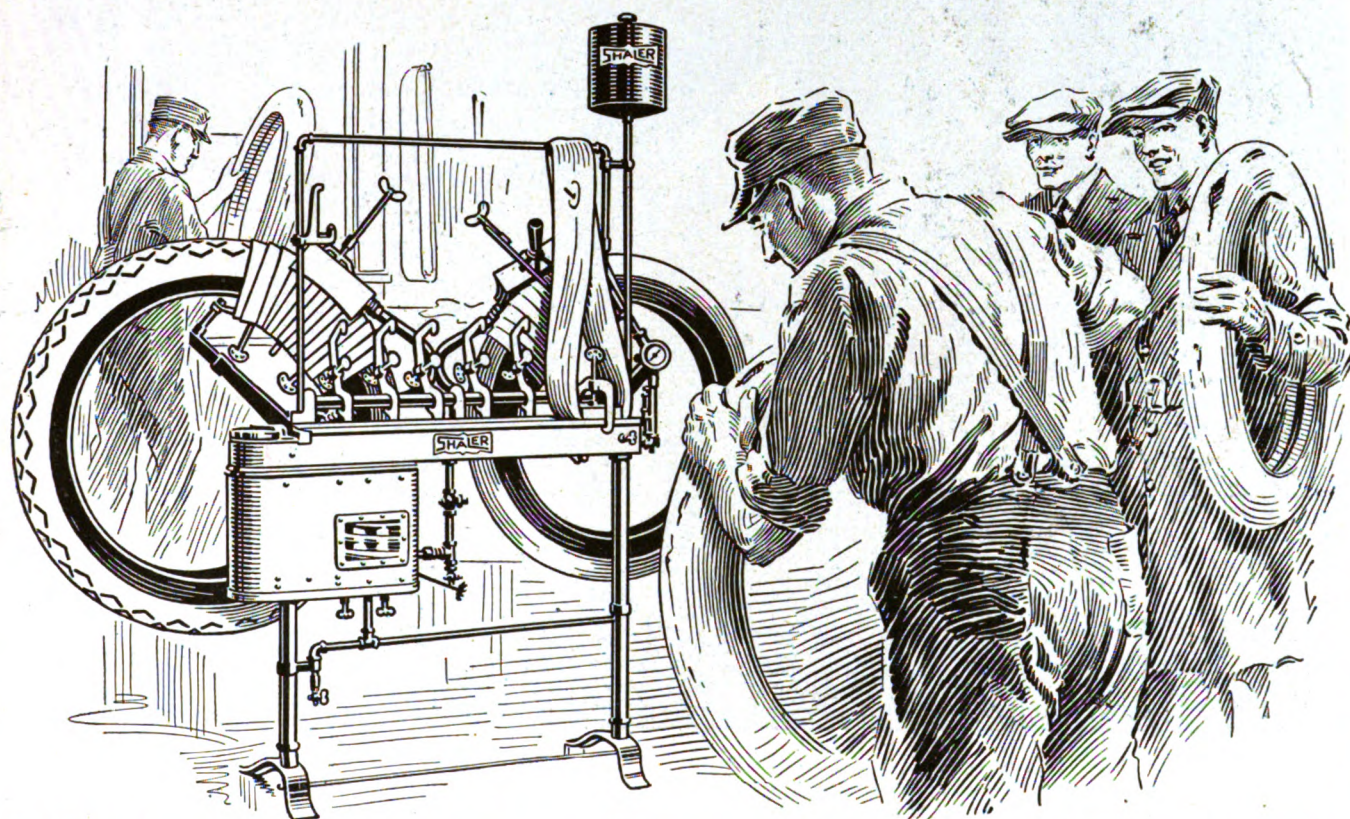
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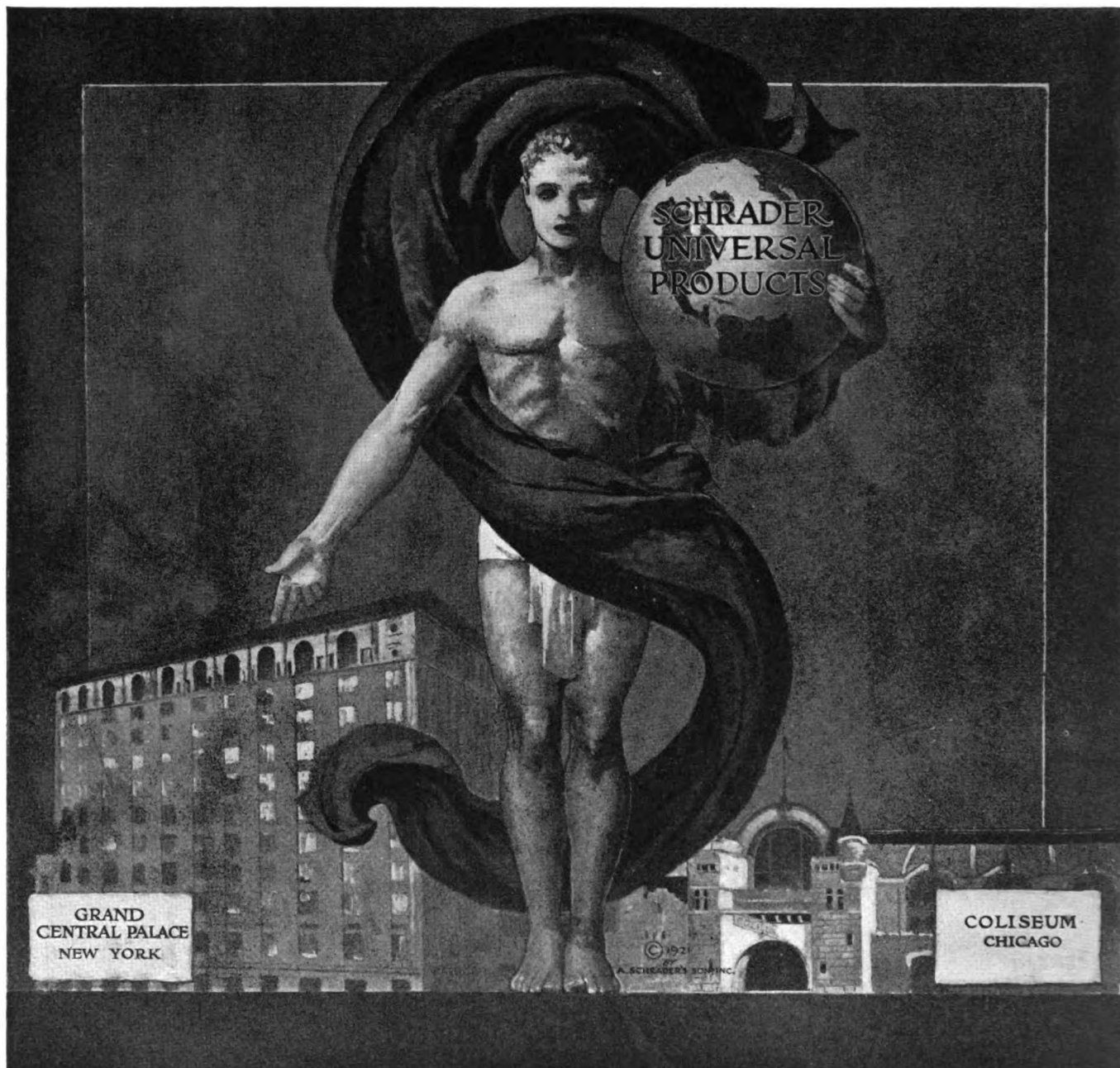
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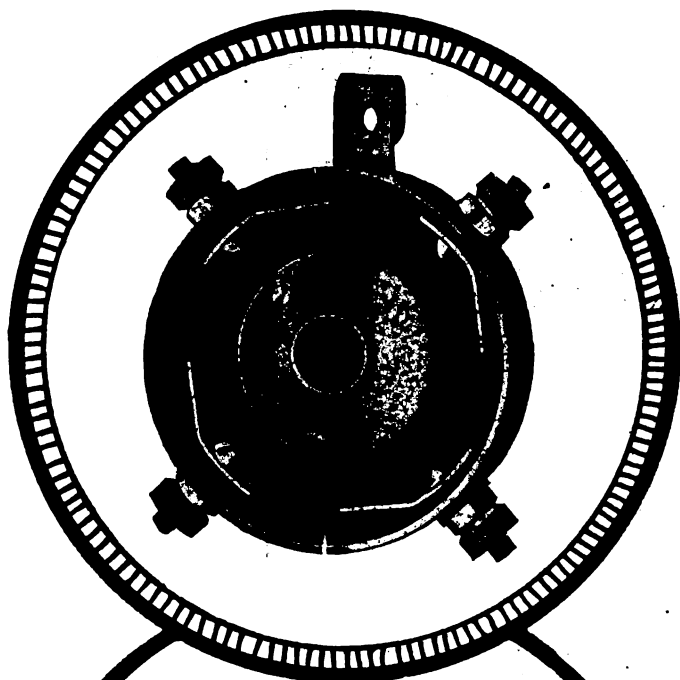
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A Business Paper for the "Small-town" Automotive Trade

TABLE OF CONTENTS

EDITORIALS

The Uphill Path.....	9
Thinking, Working, Planning.....	9
Build Business Through Courtesy.....	10
Optimistic and Conservative.....	10

GENERAL

"Community Garage" Idea Spreading, by K. H. Lansing	11-12-13
I Do a Little Good Outside Advertising, by Frank Farrington	14
"Ask 'Em to Buy" Says A. E. A.	15
The Law, the Facts, and the Garage, by Arthur F. McCarty	18
Injuries Due to Over-exertion, by Chesla C. Sherlock	20
Radiators—Methods for Their Repair, by Cloyd Osborn	21-22-39
A Timer Talk by an Old Timer, by J. N. Bagley	23-24-25
Some Business Stimulating Ideas.....	26-27
Operating the Automobile Headlight, by Robert Livingstone	31-32
Glimpses in the Garageman's World.....	33-34
The Will to Sell, by J. H. Mehan.....	39-40

DEPARTMENTS

Taking an Inventory of Your Stock, by J. N. Boddy ..	16-17
Welding, Cutting and Brazing Practice, by David Baxter	28-29-30
Practical Hints for Shop Mechanics.....	35-36
Readers' Questions and Answers.....	37-38
Here and There in the Motor World.....	41
Accessories—Dealers' Key to Profits.....	42-43-44
Up-to-the-Minute Garage Equipment.....	46-48-50-52

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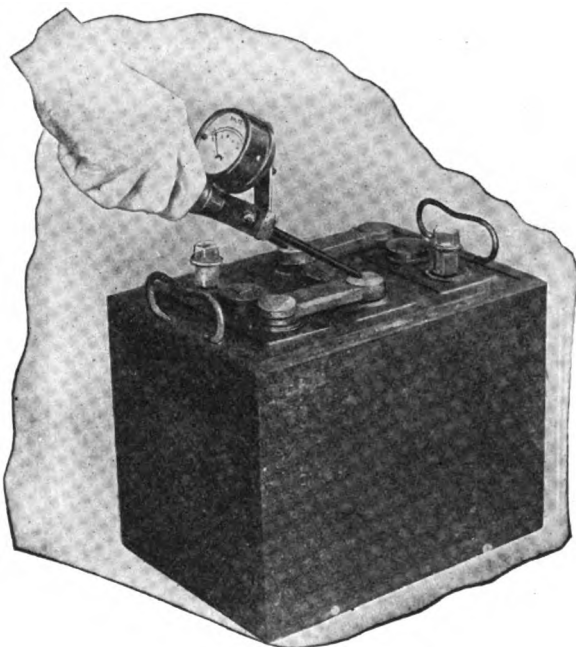
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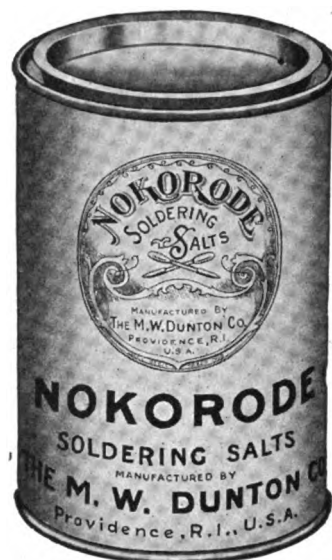
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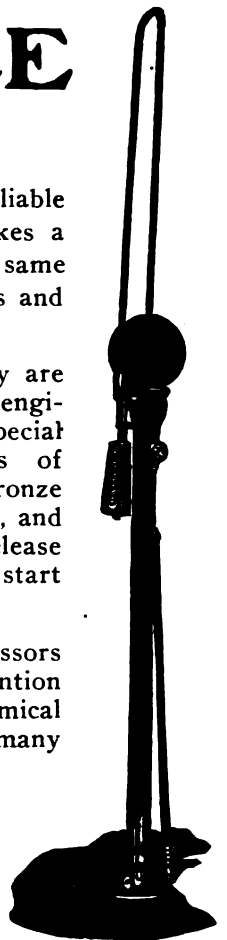
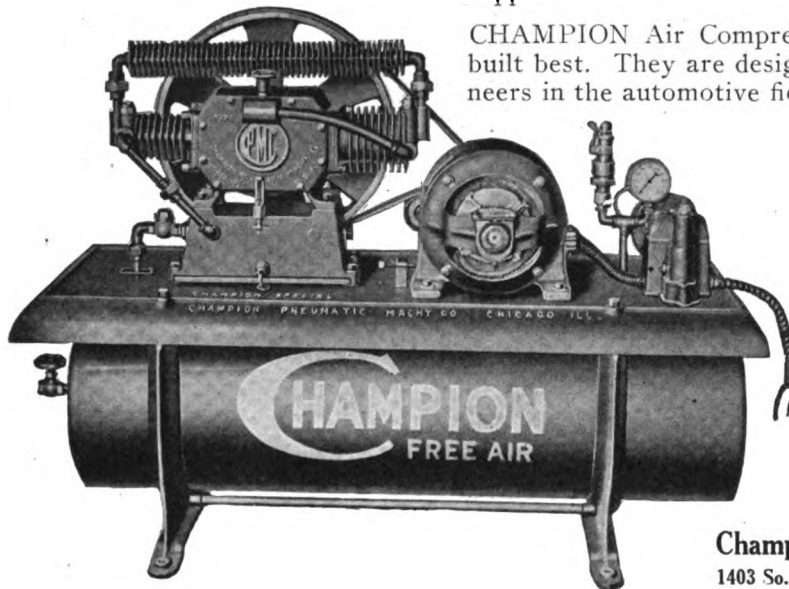
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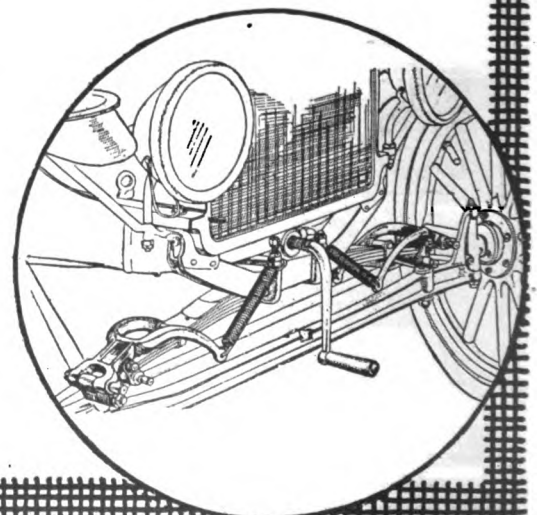
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Price \$12.00 per set of four.

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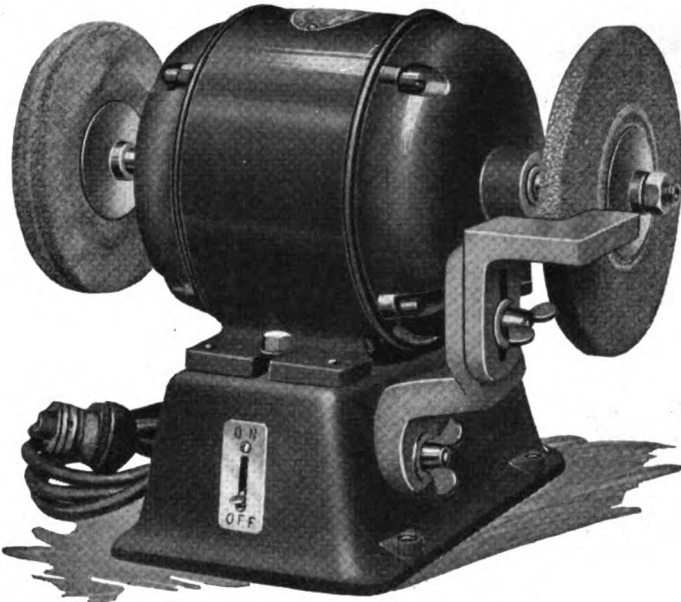
P. H. Webber Company
HOOPESTON, ILL.

Chicago Sales Office:
WALTER ECKHOUSE & CO., 616 S. Michigan Ave.
In Canada—RICHARD WILCOX CANADIAN CO., Ltd.
London, Ont., Canada



MARATHON "OK" \$25.00 Grinder and Buffer

COMPLETE WITH MOTOR



Weight: 38 lbs., bare; 52 lbs., boxed.

Less than HALF the usual price for a tool of this size and capacity.

And, we also give you our 1 YEAR GUARANTEE, which entitles you to a new motor, should defects develop within the first 12 months.

Has 6x½ in. No. 60 Norton grinding wheel, and 6x¾ in. Hanson & Van Winkle Cotton Buff.

Equipped regularly with the famous MARATHON OK single phase totally enclosed Alternating current motor; for 110 or 220 volt 60 cycle service. If Direct current motor is wanted, add one dollar for 32 or 110 volt; or \$2.00 for 220 volt.

Has convenient and RELIABLE switch in base. Machine is shipped complete with standard plug and 10 ft. cord, ready for use.

SELL TO CAR OWNERS

Buy this handy tool for your own shop, and put it where your customers can see it. Every car owner who likes to "tinker" will want one in his home garage or workshop for grinding knives and tools; polishing silverware and countless other uses. Sell the tool at \$45.00 to \$60.00 and still be below the market.

SEND CASH WITH ORDER

Or, if you prefer, we will ship by Express C. O. D. Above prices are net, F. O. B. Wausau, no discount; and subject to change without notice.

MARATHON ELECTRIC MANUFACTURING CO.

24 Island Street, WAUSAU, WISCONSIN

Flexlume Signs—

They "Hook Up" The Manufacturer's Advertising To Your Location.

WHAT are you doing to connect your show room, your store with the national advertising of the manufacturers whose cars, tires or accessories you handle?

Thousands of people know about these products,—they are "sold" on them—but they do not know where they can be bought.

The mission of a Flexlume Electric Sign is to tell them—raised, snow-white glass letters by day, solid letters of light at night. Among the other Flexlume advantages are greatest reading distance, lowest upkeep cost and most artistic designs.

Let us send you a sketch showing a Flexlume to meet the needs of your business.

FLEXLUME SIGN COMPANY
25 Kail Street - Buffalo, N. Y.

Flexlume—Electric Signs Made Only by the Flexlume Sign Co.



Any car is a better car with a Wickey Battery



The Battery That Stays Sold

Semi-Dry — No acid
to leak or spill.

Has no "wall" separators
to give out.

Will NOT freeze
nor overheat.

Plates cannot
buckle.

Does NOT require
frequent watering.

Rechargeable from
generator without removal
from car, when fully
discharged.



THERE is no basis of comparison between the Wickey and any other make of storage battery. The Wickey is a *New Type Battery* built on a new principle, having as its main features the Wickey Semi-Solid Electrolyte Compound and the Wickey Strip Isolators.

The application of this new principle demanded new methods, yet every commendable principle of good battery design and construction has been retained. The weaknesses, common to wet acid batteries, have been eliminated. Its additional, new and exclusive features make the Wickey Semi-Dry Storage Battery the best on the market today for automobile usage.

It produces happy results instead of grief. It is a battery absolutely in a class by itself. Write today for full information.

WICKY BATTERY COMPANY

730 Exchange Ave. - East Chicago, Ind.

American Garage & Auto Dealer

Comprising AMERICAN GARAGE AND AUTO DEALER, AMERICAN GARAGE MAGAZINE,
GARAGE EFFICIENCY and RETAIL MOTOR TRADE JOURNAL.

Vol. XII. No. 12.

CHICAGO

DECEMBER, 1921

The Uphill Path.

"We have passed through the primary and most acute stages of stagnation. I now look forward to an advance in economic lines," said Governor W. P. G. Harding, of the Federal Reserve System, in an address early this month on "The Business Situation." "Trade will pick up. We will reach a steadier level, probably in the Spring.

"The present generation of business men has gathered a great stock of experience, which, of course, is not negotiable. But because of this experience, when we do hit our stride, we are going to have a period of unprecedented prosperity, a more sound, more sane and more substantial prosperity than we have ever had before."

Governor Harding's words express the sentiment which prevails generally throughout the country. It is entirely different from the attitude of business men a year ago. Then we were all talking of contracting business and curtailing activities as much as possible. And there was much uneasiness expressed about the future.

Now the future is faced with confidence. It is true that farm products are now below the pre-war level in most cases, and in some cases below the cost of production. The cost of living is above the pre-war level, but is gradually seeking lower levels.

The readjustment is not completed in some lines, as the farmer is not yet back to normal conditions, and, until he gets his normal purchasing power, the opinion is quite unanimous that we will not really have normal times.

"The backbone of this country is

still the farmer," recently declared a keen observer of business conditions, "and, if he cannot pay the prices asked, there can be no return to normal. Reductions have occurred on

The Nation and the Family.

It would help us very greatly to think more clearly on business and economics if we adopted the method of picturing the population as a family. It is much easier to grasp how things affect a family than a whole nation of more than a hundred million people. A fairly safe maxim to go by would be: "What's good for a family is good for a nation."—B. C. Forbes.

all necessities, but values are still out of line with what the farmer is getting for his produce, and that condition must be remedied before there is any real improvement."

President Harding in his message to Congress at its opening session, December 6, recognized the importance of the farmer when he said:

"To the farm has come the earlier and the heavier burdens of readjustment. There is actual depression in our agricultural industry, while agricultural prosperity is absolutely essential to the general prosperity of the country.

"Congress has sought very earnestly to provide relief. It has promptly given such temporary relief as has been possible, but the call is insistent for the permanent solution. It is inevitable that large crops lower the prices and short crops advance them. No legislation can cure that fundamental law. But there must be some

economic solution for the excessive variation in returns for agricultural production."

We have faith that the new year will bring with it much encouragement to the farmer and that the heavy burden of readjustment will be relieved so that he will receive prices for his products which will be more comparable with prices of other products.

Thinking, Working, Planning.

The other day the sales manager of an up-and-going Chicago concern stated that its business for the year will be the largest since its organization 30 years ago. Then he mentioned several other companies in other lines of business which have had exceptional business increases during the year just closing.

The secret of these excellent showings is due to selling programs which meet the new conditions, backed up by the men behind it.

The selling programs of these organizations which included one automobile manufacturer, were based upon planning and digging deep into things—giving attention to details and doing it now. They are not doing, as was suggested in the title of a recent "Mutt and Jeff" cartoon, "When the horse yawns, Jeff will slip the bit in his mouth."

The people who are getting the business are those who have "Now" as their motto.

The well-rounded selling program to meet the new business conditions must be the one that takes care of details. Knowledge of fundamental

principles is what it takes to meet present conditions—and the selling program for the coming year must be one that will stand in the face of the keenest competition.

There will be keen competition in selling, for the people who are buying today are going clear to the bottom to find out why they should buy an article of one particular make. Hence it is necessary for those engaged in selling to know their product intimately—and also to be able to tell the romance of its production. That romance, by the way, may be used most effectively in advertisements.

Meeting the new conditions effectively means thinking, planning, and working—and they all must go together.

Optimistic and Conservative.

As the time for the annual inventory nears, when business men take their pencils and figure out how much they have gained or lost, it is encouraging to note the improved conditions which lie before them as contrasted with a year ago.

The year 1921 has been a difficult one but those who early developed the fighting spirit and went out after business find themselves in good positions to continue on the upgrade to better business in 1922. It is quite generally agreed that we have definitely passed the low point in depression and are now in the "recuperative" stage.

The international conference at Washington is succeeding in accomplishing wonders in the short period it has been in session. Undoubtedly its activities will result in a great degree of stabilization in world conditions—and this, of course, will reflect directly back upon this country's business.

In the automotive industry, the feeling prevails that improvement will be steady, fundamental and hence gradual. A substantial upward trend is expected to develop following the automobile shows in New York and Chicago next month. It is believed that

there will be conservatism in buying and that automotive dealers will exhibit greater prudence in making commitments and do closer period buying. In other words, they will watch all the smaller places where money has slipped from their pockets.

The year that is just closing has been one of liquidation and one of the lessons learned by automotive dealers has been that of maintaining

Industry, Politeness, Fairness and Thrift the Keys to Prosperity.

There are millions of prosperous men in this country; travel in any direction, and the most impressive thing you note will be the homes, farms, shops, factories and offices of citizens who are evidently well-to-do. Ninety per cent of them achieved success in the same way: by industry, politeness, fairness and thrift. Likewise, everywhere you will find a small minority who are not getting along very well, and in ninety cases in a hundred the cause is neglect of industry, politeness, fairness, and thrift.—Ed Howe.

conservative balanced inventories. "Rainbow chasing" and "over" optimism have been eliminated from their thoughts and conservative, sane policies will be followed with a due regard for the requirements and viewpoints of the public served.

Thus the New Year is faced with optimism and faith in conservative policies which build business upon firm foundations.

Build Business Through Courtesy.

Courtesy is the thought that is in the minds of people all over the country who come in contact with anyone who sells. The women folks complain of the lack of courtesy in those who serve them in the garage, the grocery store, the market, or department store or in those who are engaged in performing work around their homes—and the women are a most important factor in all sales.

Those garages which have been cultivating a positive, intelligent courtesy, dominating every contact with the

public, are the ones that have built a permanent good will.

"Give a thought to better telephone manners, voice and service," urged an experienced business man who sees in courtesy one of the fundamental steps towards a return to more stable business conditions. He predicts business would pick up 50 per cent more quickly if executives would imperatively require pleasing manners and a friendly voice of all employees who answer the telephone.

But it is not only over the telephone that courtesy and a pleasing manner will build business. "Meet me face-to-face" was a familiar business slogan of a few years ago—and it implied courtesy and a pleasing manner.

Just recently a car owner drove his car into a service station that is publishing an excellent series of advertisements in the local weekly paper, inviting car owners to patronize its "drive-in" battery service and other facilities it has to offer.

It was early in the evening and there were a number of cars in the place and apparently all employees were busy. The man got out of his car and looked around.

A man, evidently one in authority, came from behind a car and hastened to the office, going right by the prospective patron without a word of greeting. Then he loudly called to another man several times about something or other.

The would-be patron walked slowly towards his car—he was in a hurry and intended leaving the car there for attention—and then seeing no evidence of service of any kind got into the car and slowly backed it some 25 feet out of the garage past the man who should have given him some indication of courtesy and willingness to render service.

The work on the car was done at another service station in a most satisfactory manner, the car owner being given a pleasant greeting as he drove into the building. Which station will he be a booster for? Think it over.

Courtesy builds business.

"Community Garage" Idea Spreading

Growth of "Motor Villages" Due to Real Garagemen, Repair Experts, Filling Station Conveniences and Accessory Stocks—Pennsylvania a Leader in This Plan and Group Garages Are Especially Popular in Philadelphia

By K. H. Lansing

Almost weekly, new "community garages" are being built in both small towns and large cities in Pennsylvania and the idea is rapidly spreading outside the Keystone state, where, it is claimed, it originated. The man who asserts he was the first to erect and open a cluster or group of individual garages adjoining—which is the basic idea of the "community garage"—is Robert R. Suter, of Media, Pa., who is still in the garage business and "going strong," like one Johnny Walker.

When these garages, usually in a row, first began to spring up throughout Pennsylvania, especially in West Philadelphia, some

owners of large garages began to look upon them as an enemy of their business. This, perhaps, is because at first builders, plumbers and almost anybody having a little spare money and no practical experience along automotive lines, put them up.

But, when it became apparent that they were most successful when conducted by real motor car experts, garagemen began to rush into the business of building and conducting these "community garages." Now it is not uncommon for a garageman in Pennsylvania to have a string of these small one-car, or two-car buildings ad-

joining, or at least run as an adjunct to his large garage.

The "community garage" has certain very definite advantages which appeal strongly to garage customers, and they have almost invariably proved to be money-makers for the practical

agemen cannot always watch closely—have constant access.

The group garage is also a favorite among women who drive their own cars, as they are not subjected to any disagreeable features, such as remarks from the rougher type of garage hanger-on, when they are removing or returning the vehicle. Any car owner may feel reasonably well assured that his or her car will be intact with its entire equipment when it is called for which, unfortunately, as garagemen know to their cost, is not always the case in the public garage where cars are exposed on the floor.

Again, should the owner feel like repairing his car, he may do so, as almost invariably there is ample room for him to work inside the small building where his car is housed, and he may install even a small work-bench there, with a kit of tools, which he knows will be safe as he alone carries the key.

Most of these "community garage" buildings, or compartments, are constructed of brick and hollow tile with cement flooring, and often each one has its hot water heat, electric light and water. Usually there is at least one competent employe to wash or



Salesroom of One "Community Garage" Specializes in Both Exterior and Interior Displays That Are Distinctive.

operator of a group or row of them. The favorite method is to erect them in rows of 40 to 50, some of the little brick buildings housing single cars, or trucks, and a smaller proportion of them being constructed to harbor two cars or trucks. Motorcycle riders who use side-cars are especially partial to them.

As the patron's motor vehicle exclusively is stalled, a higher rate is charged in the individual garages, usually, than in the large public garage, where many cars are placed side by side on the same floor and to which numerous persons—whom busy gar-



Here Are Two Typical "Midways" Which Are Formed by Arching the Entrance to Rows of "Community Garages."

repair the patrons' cars for those who desire the service enough to pay for it. Such an arrangement provides car owners with all the advantages of both the public and private garage, with none of the disadvantages of either.

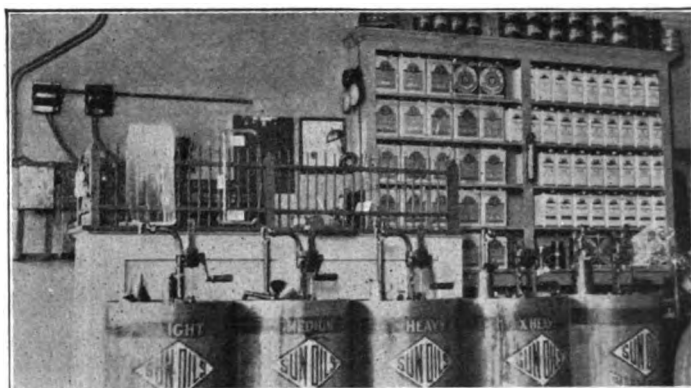
The usual plan of the garage cluster, or row, is to call around it a sort of "motor village" consisting of small shops for vulcanizing, tire and accessory sales, and repair stands. Frequently, either the "motor village" springs up around an oil filling station, or the filling station quickly comes to its close vicinity. In any event, the various types of automotive supply men are quick to see the advantage of being near to, or a part of, this tiny community and of making it grow to important proportions. The shopmen find their customers here "ready-made" and there are usually enough of them to form a pleasing prospect list.

Some of the most effective "community garages" form a "midway" out of double rows, or three-sided clusters of these buildings, erecting an arched entrance, producing an ornamental appearance, and making the layout of structures far more presentable in a residential neighborhood than monotonous, uniform rows would prove.

In suburban districts, and also in overcrowded sections, these "community garages" are "life-savers" for car owners. The men who make their living by working for these car owners, after a while at least, forget their jealous fears and gladly welcome additional shops—even in their own line—to these centers of activity. They realize that such a community begets business—as a center of department stores always results in benefit to the various units of that center—provided they are well conducted and there is not too much overhead at the start.

Lately, there has been an effort to have the filling station—if there be

How's This
For Ultra-
Neat Oil
and Grease
Department?



one—the row of garages and any tributary buildings, conform in color, architecture and general appearance. When this can be done, the effect is pleasing, and residents in the vicinity seem to have no objection to the presence of the "community."

Some of these major buildings of

COMMUNITY GARAGE
(Accommodations For 47 Cars)
Now Completed At
NORTH QUEEN & CLAY STREETS
25 Single Car Garages 11 Two-Car Garages

Constructed of brick and hollow tile, with cement floors. Each garage has hot-water heat, electric light and water.

Competent man will be in charge to care for washing and necessary repairs for those who desire this service. Free air will be supplied.

The arrangement will give tenants all of the advantages of both private and public garage with none of the disadvantages of either.

Your tools, robes and parcels cannot be disturbed nor your car tampered with or operated without your consent.

For rates apply to
Christian Gunzenhauser
Prince and Clay Streets

the garage groups are beginning to carry all sorts of conveniences for car owners—far removed from automotive equipment—for it is quickly seen that a good general trade can be worked up from such a wide patronage to start with. This is especially true when the garage communities consist, as do a few in Philadelphia, of 80 to 125 individual garages.

The owner of such garages has been

alert to see that, as he is the first merchant on the ground, it is better for him to secure the promising trade in daily papers, periodicals and other small conveniences for his patrons than to let one of his tenants have this privilege.

Then there is often a chance for the garage owner to obtain additional revenue from some of his patrons—if they happen to store their business cars or trucks in his place—by renting them bulletin-board space for their advertisements on top of the individual garage building they occupy. This is often done in the case of tin roofers and gas fitters renting garage space.

Such a garage group has many opportunities for the owner, or the various shopmen comprising the "community," to sell equipment to the car owners. The owner or operator of such a group of buildings is in much closer personal contact with the car owners than is the ordinary automotive equipment dealer. He can see them at least twice a day, if he wishes to, and can show them equipment and "ask 'em to buy."

The usual range of prices at which the less luxuriously appointed individual garage is rented is from \$9 to \$12 a month, but some of the best bring in as high as upwards of \$15 monthly.

The "community garage" is well liked in Lancaster County, Pa., and in Lancaster particularly. Here they put up long rows of individual garages, some of which are notably well-equipped with light, heat, water and other conveniences, a feature being the supply of free air to patrons. These places are advertised in Lancaster much more thoroughly than they are in Philadelphia, although the latter city has by far the larger number, of course.

One of the most complete arrangements of conveniences for patrons is noted in the West Philadelphia "community garage" which is owned and

Complete
Workshop
With Handy
Bins, Bench
and Tools.



operated by Ware Bros., at 5918 Baltimore Ave. These two young men fearlessly opened a row of 50 small garage buildings in the rear of a main sales and service building of one story, almost in the heart of a district already well supplied, apparently, with large garages and "community garages."

They made good from the start. Their sales and service building is particularly good looking for a group garage. There are two entrances for patrons in front, but none, of course, for cars, as the front portion of the structure is devoted to sales of automotive equipment, tires and tubes, oils and greases and the like, as well as tube vulcanizing service. Immediately in the rear is a good-sized repairshop, where two mechanics employed by the Ware brothers work on customers' cars.

The shop is well provided with small tools, bins for parts, and a long workbench, extending almost the entire width of the shop. It is the largest and most practical repair department ever noted by the writer in connection with a "community garage."

Both the Ware brothers are practical motor mechanics, too, although most of their time is taken up with curb service and sales. Patrons are permitted to wash their cars, free of charge, in the repairshop washroom, but must supply their own sponges and chamois skins.

The salesroom has two large show windows in which are well-displayed tires and a few samples of the equipment that may be purchased. Out in front are: A big gasoline pump, of improved type; a device for supplying free air; and several signs, one of which announces in bold lettering:

**CARS
WASHED
OILED
GREASED**

**OIL DRAINED
NO CHARGE**

Of course, there are charges for the upper items, and charges for time and grease or oil. But oil-draining is a disagreeable job and customers are glad to have it done for nothing. It is usually profitable for the Ware brothers, for this reason:

When oil is drained from a customer's car and fresh oil substituted, the speedometer reading and date are noted and filed by whoever is doing the work. Thirty days thereafter, or

about the time the car should have run approximately from 800 to 1,000 miles, this customer is called by telephone, asked what his speedometer reads and solicited for a new draining and refilling date at the garage. In fact, the Ware brothers prove that a well-conducted "community garage" may be just as systematic as the largest public garage.

This thought is followed out further

FOUND IN ONE GROUP GARAGE.

Salesroom with thousands of dollars' worth of stocks, including accessories, parts, oils, greases, tires and tubes.

Complete repairshop with bench tools and free washroom.

Vulcanizing department for tubes.

Bin arrangement that would do credit to a big accessory store.

Individual garages harboring either passenger cars or trucks and charges made according to size of building rented by car owner.

Good follow-up system of post-cards used for prospects and customers.

Oil drained free leads to profitable business.

by the brothers in their follow-up post-cards to patrons. They have a large mailing list, containing the names of all automobile and motor truck owners within a radius of five blocks of their place of business. Not once a month, but every eight to ten days, they send out post-cards to these customers and prospects, varying the text on the subject of the owners' needs from time to time.

Such a card may say, for instance: "Has your motor oil been drained in that last 1,000 miles?"

"If not, have it done free of charge at

WARE BROS.,

5918 Baltimore avenue, Philadelphia."

The brothers sell "Sunoco" and "Mobiloil," Betholine gasoline and Atlantic gasoline and oil, and the names of these brands appear at the bottom of the post-card. They also sell Good-year, Fisk and Kelly-Springfield tires and tubes. For vulcanizing tubes, they have a Lowell vulcanizer and tube plate and, later, they expect to use their retreader of this make for mending shoes. Their equipment for tire handling includes, also, a Weaver

changer, or rim machine, and a Weaver tire-spreader.

The bulk of the tire stock, which averages around \$1,500 worth, is kept neatly in a rack. The stocks of accessories, oils and greases, and small Ford parts such as hubs and lamps, are valued at about \$3,000. The various lines are displayed neatly in bins and on open shelves within close eye-range of customers and there are eight 55-gallon oil tanks in reserve. The interior of the little store would do credit to a high-grade automotive equipment establishment, as regards orderliness and arrangement.

The prices for the garage spaces are a little higher here than in the usual run of "community garages." There are 33 buildings with space measuring 18 feet by 8 feet 6 inches, renting for \$10 a month; seven, 20 feet by 9 feet at \$12.50 and ten 22 feet by 6 feet at \$15.

The Ware brothers say that, when they add 25 garages to this group—which they plan to do soon—they will make the largest size somewhat smaller than at present, as they have found that 22 feet by 6 feet is too much space to allow even for a large truck. They harbor at present several big commercial vehicles, among them being a five-ton White and a three-ton Republic, placing them in individual garages, the same as in the case of passenger cars.

Investigators Determining New Lubricant and Fuel Sources.

The question of new sources from which to supply the fuel demand and, in no lesser measure perhaps, the lubricant demand, is absorbing the attention of skilled investigators.

Some consideration has been given to the possibility of obtaining these necessities from hydrocarbon shales which have been found in large deposits in certain eastern and western sections of America.

The expense of production and the unavailability of suitable apparatus have handicapped any satisfactory progress in this direction.

A report of an expert of the United States Geological Survey has shown that the shale in the Utah portion of the Uinta Basin would yield 42,800,000 barrels of crude shale oil. Still another authority has expressed the opinion that 5,080,000,000 barrels of oil can be produced from the Colorado shales.

I Do a Littel Good Outside Advertising

The Boss Sent Me Out to Put Up Sum Advertising Sines the Other Day
an Let Sally Go Along to Hold Nales—He Sed He Gessed He'd Send Persy
Next Time but I Told Him I Thawt Persy Was Too Valuebel in the Offis

By Frank Farrington

Deer Pete:

I aint got enny shofers lisens, Pete, but I went shofing the other day just the same and I aint got to tell you I went with Sally either becaws you kno who Ide be taking if I got a chanse. Sheez got all over being sore at me and Ive promist never agen to call her Sallyratus. Gee, sheez sum littel flapper, Pete, and I gess I aint made a very bad hit with her, too.

Well, I diddent kno but weed hit Pinkvill before we got thru. I got out a old mekannickle crickit the boss sed I cood take and washt it up and put on a Pike citty pediment to show where we was from and we went.

Gee! That old bote did heet up, Pete, like a pipeliss furnis and by and by going up sum hills she boild and steemd till I thawt sheed bust her biler. But I kep rite on going and then we got to a place where I saw a sine that sed "Home made ice cream" and I saw Sally was looking at it so I sed lets stop and fill up. So I slode down and stopt but the old enjin went rite on just the same. I stoppt the ignishion and put the acksellerator down as far as it wood go, but the old enjin kept a whooping rite along.

I see we coodent leev her going like that because sheed never get coold off and sheed never stop til she run out of gas. Then a feller whod bin waching me came and sed: "Where's the place where you turn off the gas?" and we found that and turnd it and she had to stop.

But I diddent tell you how it cum that the boss let me take out the bus and moter around. Sally calls it motering so Ive got to. Well I saw a pile

of sines in the back room and they lookt like they was ment to be put up around the country to advertise Ruff-rode tires.

I askt the boss what he wanted me to do with em when I was cleening up, and he sed "I want you to take em out and nale em up on fenses and trees. Youre a good walker aint you?" I sed yes but I was a better rider.

bands and then we started. Ide stop at every farm and Sally would put in the mail box out in frunt of the hous a packij of advertising stuff—one of eech kind with a rubber band around it.

Where they diddent hav enny mail box then Ide sumtimes toss it where there was sumbody neer the rode that cood see me do it, and sumtimes Ide stop and go and put it on the frunt stoop or in the barn or garaje dore. Weed put the stof where it wood do the most good.

So when we got back with the old heeted up bus weed put up a nice lot of fense sines, and give every farmer sum good advertising about tires and tractors and a lot of more things. The boss thawt it was a pretty good skeem and it looks as if Ide get

another trip or 2 out of it. He sed he gesst heed send Persy with me next time but I told him I thawt Persy was too valuebel in the offis.

I learnd sumthing from Persy today, Pete, but not becaws he did sumthing extry good. He pulld a bone and this was how it happend. A feller roled up in sumthing that lookt almost like a automobeel and sounded like a concreet mixer thats bit off moren it can chu. The feller wanted 2 gals of gas and he got all that and handed Persy a bill and Persy took it and went into where the cash rejijister is at and cum back and giv the guy 40 sents and started back and the guy says, "Hold on there. I giv you a five doller bill."

Persy lookt him over and sed "What's that. You giv me a five? You giv me a one, thats what you giv me, and theres your change."



"I Saw a Sine That Sed 'Home Made Ice Cream' and Saw Sally Looking At It, So I Sed, 'Lets Stop and Fill Up.'"

I sed "How about that old tub in there that aint being used? I cood take that and put sines all the way to Hixport on one rode and back on the other if I had sumbody along to hold the nales for me."

The boss he just lookt at me kind of funny and askt if I cood think of ennybody I thawt wood be good at holding nales. I sed I thawt Sally wassent very bizzy that afternoon and thats the way it cum about.

Well, I got to thinking about it wile I was getting reddy to go and it seemd as if a feller as smart as me awt to figger out sum way so that littel trip wood be such a useful one that the boss wood want us to go agen.

So I got all the advertising stuff in the place, littel books and catalogs and cards and things, and I got em all sorted and a lot of littel rubber

Then the feller got mad and I thawt heed throw his littel automobeel rite at Persys hed. He sed: "Dont try enny of that short change stuf on me. Ime wize to you garaje piruts. Cum across with fore more dollers or Ile hav this place pincht inside of 15 minnits."

I was standing just inside the dore lissening and saying nothing. But the boss was lissening too from where he was bizzy talking to a man and the boss wassent struck dum. He approached. I gess thats the word Pete. He cum to where Persy and the man was and sed a few words and then he went in and lookt in the cash rej-

jister, and there in the dollar pew was a 5 doller bill. So he had the goods on old Persy.

Then the boss apollogized and he made Persy do it too, and even then it diddent look to me as if the feller buleevd em. He was a stranger and he seemd to think everybody was out to cheet him.

Mr. Persy got a littel advice rite then and I was lissening in an I took the advice too and thats how I lerned about Persy. The boss sed:

"I spoze you made a mistake and thawt you were rite. I dont buleev you were trying to slip ennything over on ennybody. At leest I hope you

werent. Ennyway after this I want the feller that sells gas to let the customer hold onto his bill until you cum out with the change. Then they can't kick about what it was they giv you.

"Ennybody mite make a mistake and think he giv you a 5 when it wasent a 5 a tall. This time the customer was rite. Next time he mite be rong and then weed looz. So wach your step and there wont be enny trubbel."

Thats good advice and I can take it even if he diddent giv it to me. Ime that way. So long old squawberry,

Yours for the rite change,
Bill.

"Ask 'Em to Buy," Says A. E. A.

Enthusiasm and Confident, Optimistic Belief in Outlook for "More and Better Business" Furnish Keynote of Automotive Equipment Association Convention at Chicago Last Month—Sales Promotion Plan Is Endorsed

A record-breaking attendance, the largest since the organization of the association, characterized the convention of the Automotive Equipment Association held at the Coliseum in Chicago, November 14-19.

The buying at the exhibits showed a material increase over that of last year, and it was reported that retail buying had shown a considerable increase since September.

Some new products were shown and the demand for space was such that some members were unable to snow.

Whereas, a year ago, jobbers could be persuaded to show little more than a passing interest in exhibits, this year the buying interest was pronounced. In fact, it was said that one manufacturer made sales amounting to \$42,000 in one day. Practically all the exhibitors reported sales in excess of those made at the 1920 exhibit.

Ray W. Sherman, merchandising director of the association, delivered an exceedingly interesting address on the progress of the sales promotion campaign, and his plan of organization and furtherance of the campaign were heartily endorsed.

In his address, Mr. Sherman directed attention to the effective work done by the jobber salesmen in acquainting garagemen and dealers with the sales promotion idea. He asked the manufacturers for their active participation in sales promotion plans, for co-operation from sales representatives and executives, for products combining the greatest possible value and utility, and for advertising such as will really aid the dealer in making sales.

He told his audience that the country is being covered as rapidly as possible by the merchandising director and one or two assistants in an effort to instruct jobber salesmen how to get the plan before dealers.

Dealers are included in these meetings whenever possible.

Headquarters and member representatives will speak at state and local dealer association meetings and at gatherings of dealers during the show season. An association paper, known as the Leader, and a campaign publication, the Automotive Equipment Merchandiser, will keep members

DON'T BE CLASSIFIED.

There Never Will Be any Chance for—

The idler, the indolent, the lazy.
The leaner.
The coward.
The wobbler.
The ignorant.
The weakling.
The smatterer.
The indifferent.
The unprepared.
The clock watcher.
The impractical theorist.
The slipshod and the careless.
The man who has no iron in his blood.
Those who do not think it worth while to improve their minds.
The person who tries to save on foundations, who does not think it pays to prepare.—Ambition.

informed and bring home to the salesmen of manufacturers and jobbers the sales promotion idea.

Dealers can obtain, on request, the manual on automotive equipment merchandising, "A Better Business," at 15 cents per copy.

A motion picture entitled, "Ask 'Em to Buy," was used by Mr. Sherman with his

talk. The plot for this "movie" was obtained from a story supplied by Ike Doherty, a salesman for G. Norman Baughman Co., Tampa, Fla., and was based upon the actual experience of a garageman. The progress of the "hero" from a stage of "near starvation" to real prosperity, because he was brought to a realization of the possibilities for profitable sales of automotive equipment, was of interest.

The question of the equalization of freight charges was brought up at a divisional meeting of the manufacturers, and means for meeting the problem discussed. The report of the traffic bureau of the association showed that the bureau had obtained \$4,600 in freight overcharges for 69 of the association members during the year. The bureau plans to attempt to secure an amendment of railroad classifications which have given shippers of wagon parts an advantage over firms shipping automobile parts.

A suggestion, looking toward the establishment of a technical laboratory for passing upon replacement parts products, was also referred to the board of directors, products passing the test to be stamped with the approval of the association.

In view of the steady growth of the association, it is expected that the second as well as the first floor of the Coliseum annex will be used for the show next year, necessitating the removal of the convention to a nearby building.

The convention expressed its appreciation of the effective work being done by the trade papers.

The association will hold a summer meeting at Colorado Springs, June 19-25 and and the 1922 annual meeting and business exhibit at the Coliseum, Chicago, November 13-18.

Taking an Inventory of Your Stock

Have You Been Stocking Materials Without Keeping a Record?—Is Your Supply Room a Collection of Iron or Does It Mean Something—Why Not Arrange Your Material Systematically and Start the New Year Right?

By J. Newton Boddy, C. P. A. (N. A.)

Auditor, Accountant, Systematizer, Specialist in Automobile Accounting

The taking of an inventory is one of the big problems of the average garageman or automotive dealer. I believe I am conservative in stating that not one in five of those who actually take an annual inventory get it accurate. The value of a financial statement depends largely on the accuracy of the inventory.

Inventories may be divided into several kinds—physical, estimated, perpetual by quantity, perpetual by dollars and cents, and perpetual by quantity and amount. Perpetual inventories may be carried by items or by departments.

Where a perpetual inventory is kept, the business escapes the confusion, loss of time and service, and usual additional expense. Where a perpetual inventory is kept, the book records should be constantly checked against actual stock and corrections and adjustments made to keep them in agreement. Checking by items or departments involves 'but a few minutes' time each day.

Where a perpetual inventory is carried, the taking of an inventory is a very simple matter and can be done to suit the owner's convenience. It consists of taking the stock ledger and checking it, item by item, with stock on hand. However, as few concerns carry a perpetual inventory, or carry it in dollars and cents only, we are called upon to suggest an accurate and speedy method of taking an inventory.

The taking of an inventory applies especially to the first two kinds mentioned—physical and estimated. The estimated inventory is a book inventory, and it is set up by figuring a certain percentage of sales as cost of sales. As

Date_____No._____
Item_____
Size_____
Location_____

Date_____No._____
Item_____
Size_____
Location_____

Quantity

Price

Amount

The Inventory Tag.

the item of freight, express, parcel post and other carriage charges on purchases is variable, the estimated inventory is seldom accurate and so cannot be relied on without verification by a physical inventory. And the speed and accuracy of taking inventory depends to a large extent on the preliminary preparations.

To start with, stock checks, as shown in the illustration, with stubs, should be purchased. These should show date, item, size, location, quantity, price and extension, and should have eyelets so that they can be either tacked or tied to bins or parts. Next, all stock should be properly assembled so that the same items will be as nearly as possible in one place. Now you are ready to take inventory.

Number and date sufficient tags, top and stub, to tag all your stock. Start in on a well-defined route and tag all your stock, in the salesroom, office stockroom, shop and yard. Tag everything belonging to you which is not actually a part of the building. Very many garagemen have open shop space or parking space which is often overlooked in taking inventory. When tags are all distributed, go back over your ground and fill in spaces on tags showing item, size, and quantity on both top and stub. When this is done you are in a position to pick out a few important items and verify the count on the tags.

Now collect your stubs, making sure that you have collected all issued. Arrange them numerically and see that there are no breaks in the numbers. When proper preparations for this work have been followed your stock can be counted and posted on the tags after business

[illegible]

Reduced Size Inventory Sheet—Used for Recording Quantity, Prices and Extensions.

hours so that there will be no changes in the inventory during the count.

Your inventory is now complete as to quantity and can be priced and extended at your convenience. When your stubs have all been properly priced and extended and the prices and extensions checked, they are re-assembled into departments and posted to inventory sheets, such as shown in the illustration and which can be procured from the local stationers. These should be filed to make a permanent inventory record, which is of great value in taking later inventories and for insurance purposes.

Finally, be sure the sum of the extensions on the stubs and the total on your permanent inventory sheet agree.

The only way an accurate inventory can be speedily taken is to plan a system of taking it and stick to the plan. Haphazard, hit-or-miss inventories mean nothing and are oftentimes very misleading. For taking inventory the writer suggests the following departments the inventory should cover:

1. Cars, trucks, trailers, tractors, farm electric plants.
2. Service cars,
3. Shop equipment.
4. Tools.
5. Shop supplies.
6. Parts.
7. Tires and tubes.
8. Supplies and accessories.
9. Furniture and fixtures.
10. Office supplies.
11. Gasolene.
12. Oil and grease.
13. Jobs in process.
14. Used parts and scrap.
15. Miscellaneous.

This is not complete and special departments, such as batteries, radiators, tops and bodies, vulcanizing, etc., must not be overlooked.

Your inventory of furniture and fixtures, shop equipment, etc., should agree with the ledger accounts, the only possible adjustment being on account of discarded or scrapped items that were not properly so recorded on the books. It is not necessary even to price the tag stubs, as the amounts for the inventory sheets can be posted from the ledger account.

In conclusion, let us suggest that the taking of an annual or semi-annual inventory can be avoided and should be unnecessary. Any garage-man or automotive dealer, be his business large and small, can carry a perpetual inventory and so be in a position to make an accurate financial statement on short notice. There is a choice of so many ways of carrying a perpetual inventory that it is a pity any stock should be poorly balanced.

New York and Chicago Shows to Excel All Predecessors.

Preparations for the national automobile shows, in New York and Chicago, which are rapidly nearing completion, assure those who have followed them that the displays will be the largest and most comprehensive the country has ever known. The New York event, the first half of the show, will be held in Grand Central Palace, January 7 to 14, and the Chicago event, the second half, in the Coliseum and Armory, January 28 to February 4.

S. A. Miles, manager of both displays, promises that the decorations will surprise visitors. It is also known that car manufacturers throughout the country are co-operating from every possible angle to make the shows the greatest ever. This is reflected in the record number of exhibits.

Dealers are anticipating big results from the show and this optimism has spread to surrounding towns. Dealers and distributors are now imbued with the idea that 1922 will witness a revival of prosperity.

One of the outstanding features of the 1922 show will be the great values in the cars displayed. Never before has a prospective automobile purchaser been offered the value he can now get. Ever since the war motor-car manufacturers have been profiting by the lessons learned when the plants were being used by the government. As a result, they have been able to reduce costs and at the same time show betterments in their products.

There will be 92 car manufacturers exhibiting on the four floors of the Grand Central Palace in January, as against 88 last year. This record number of exhibitors means that there will be nearly 400 different models shown.

Eight new makes of cars, including two foreign ones, will be shown at New York. These are the Bouronville, Handley-Knight, Rickenbacker, Wills St. Claire, Kelsey, Itala and Vauxhall. The last two named are foreign makes that will be on display.

This season's New York exhibition will also show to the public the largest display of accessories that has ever been located under one roof, in spite of the fact that it was impossible to find space for many who applied for booths. In New York, the accessory booths number 233, and they will show a most varied line of devices and appliances that go to help the motorist.

Census Bureau's Summary of Automobile Industry for 1919.

A preliminary statement of the general results of the 1919 census of manufacturers, with reference to the automobile industry, has been issued by the Bureau of the Census, Department of Commerce, Washington, D. C.

Reports were received in 1919 from 315 establishments with products valued at \$2,387,834,000, as compared with 300 establishments in 1914 with products to the amount of \$503,230,000. Of the total value of products in 1919, about 56 per cent, or \$1,332,076,000, were reported by the 68 establishments located in Michigan.

The total number of automobiles manufactured in 1919 was 1,683,938, valued at \$1,555,129,000, as compared with 573,039 in 1914, valued at \$465,058,000, an increase of nearly three times in number and over three times in value. In 1919, the total number of automobiles included only 3,034 electric and 406 steam-propelled machines, while in 1914 there were 4,669 electric and 401 steam automobiles manufactured.

The \$533,068,000 reported as bodies and parts in the accompanying table represents only such bodies and parts as were produced for sale by establishments engaged in the manufacture of complete automobiles, and does not include the value of bodies and parts made by establishments making no automobiles.

Statistics for 1919 and 1914 are summarized in the accompanying statement. The figures for 1919 are preliminary and subject to such change and correction as may be found to be necessary from the further examination of the original reports.

Comparative Summary of Statistics for the Automobile Industry, 1919 and 1914.

Type.	1919.	1914.	Value.	1919.	1914.
Total(1)	1,553,349	543,438	\$2,387,834,000	\$503,230,000	
Passenger vehicles	1,553,349	543,438	1,318,038,000	413,696,000	
Roadsters	51,360	(2)	58,033,000	(2)	
Runabouts	120,098	81,597	80,523,000	45,890,000	
Touring cars	1,224,347	451,032	977,411,000	345,973,000	
Closed cars	156,328	10,809	200,015,000	21,833,000	
Other cars	1,216	(2)	2,056,000	(2)	
Public conveyances					
Cabs, omnibuses, etc.	1,877	443	3,101,000	846,000	
Government, municipal, etc.	2,736	728	13,619,000	3,941,000	
Ambulances	391	49	613,000	139,000	
Fire department apparatus	759	662	6,939,000	3,757,000	
All other (mail delivery, tanks, patrol wagons, street sweepers, rollers, etc.)	1,636	17	6,067,000	45,000	
Business vehicles	120,914	24,172	212,204,000	40,278,000	
Delivery wagons	18,122	4,391	16,570,000	4,750,000	
Trucks	101,837	19,519	193,351,000	34,741,000	
All other	955	262	2,283,000	787,000	
Chassis	192,418	(2)	181,889,000	(2)	
Trailers	15,606	(2)	6,534,000	(2)	
Bodies and parts			533,068,000	(2)	
All other products			119,381,000	44,469,000	

(1) In addition, in 1919, 5,012 automobiles and 80 trailers to the value of \$8,067,562, and in 1914, 4,258 automobiles valued at \$6,296,568, were reported by establishments engaged primarily in other industries.

(2) Not reported separately in 1914.

The Law, the Facts and the Garage

Did You Ever Make a Nice Sale and Then Find You Couldn't Collect Because the Customer Was a Minor?—Some Facts Regarding Instances When the Law Enters Into Ordering and Sale of Goods—Have You Thought of Them?

By Arthur F. McCarty

Elwood Brown, proprietor of the Brown Garage & Auto Supply Co., arrived at the front door of his establishment a little late that morning. Nevertheless, he stopped a moment to look over the handsome display in the window. The outing season was just beginning, and there was depicted in relief a miniature landscape, with its winding road following a lovely valley.

Motor cars traversed it at intervals and, seemingly, all were headed for an attractive camping ground in the left foreground where several automobiles camping parties were to be seen. The background of the window held an assortment of things the automobile tourist finds convenient, if not wholly necessary, and Brown himself sensed the feeling the display engendered—to get out the car, fix it with spotlights, camping equipment and the like, and go.

As he passed to his desk on the balcony overlooking the salesroom, a salesman approached with an order which he handed to Brown.

"I just sold a nice bill of stuff to that young man who went out as you came in, Mr. Brown," said the salesman. "But most, if not all of it, has to be ordered specially."

"I noticed the fellow. He's a good-looking young chap. Who is he?"

"He's a machinist at the railroad shops, Mr. Brown. I've gotten to know him right well, as he has been in here several times. He always buys good stuff as he draws high pay. Said he'd have all the money ready when the goods got here."

"Well, I hope so, since this order comes to nearly a hundred dollars. Couldn't sell him out of stock?"

"No," said the clerk. "He wanted that large size automobile trunk and the spotlight, bumper and cigar-lighter he required were all of styles we don't carry in stock."

"All right," said Brown, and he wrote up the order and dropped it into the mail, then turned to his work. But soon he was interrupted again, this time by his son, Lawrence, home

from law school for the vacation, and calling to visit with his father until lunch time.

"Well, son, how're things going at school? Learning any law?"

"Going fine, Dad, and I'm learning some law, too. Just got through

Get It Done.

It isn't the job we intended to do,
Or the labor we've just begun,
That puts us right on the balance sheet,
It's the work we have really done.

Our credit is built upon things we do,
Our debit on things we shirk;
The man who totals the biggest plus
Is the man who completes his work.

Good intentions do not pay bills;
It's easy enough to plan.
To wish is the play of an office boy;
To do is the job of a man.
—Richard Lord.

'Contracts' and started in on 'Agency.'

"Oh, you've mastered 'Contracts,' have you? Well, I'll try you out on a little matter that just came up. A young fellow who is a machinist at the shops was just in here and ordered nearly a hundred dollars' worth of accessories—special order. Now suppose after the goods get here, he refuses to take and pay for them?"

"Is the young chap of age?" asked the embryo lawyer.

"Of age? Never thought of that—don't know. Wonder if Nelson does. Nelson!"

But Nelson didn't know either, so Brown sent him off to the offices of the shop to learn the age of Claud Boys, the machinist.

"Let us suppose, then," proceeded Mr. Brown, "that this chap is under age; can I make him take the goods and pay for them?"

"No, you can't, Dad. An infant, or minor, is not bound by his contracts unless he chooses to be. When selling to a minor that fact must be considered, as well as the character of the goods."

"Character of the goods? What has that to do with it?"

"If the goods are what the law calls 'necessaries,' and he takes them, he has to pay for them," said Lawrence. "But you can't enforce his agreement to take them, even if they are necessities; also, even if he takes them, you can't collect if they are not necessities and he chooses to repudiate his contract. All you could do then would be to get them back. Sounds fearfully complicated, doesn't it?"

"I'll admit it does," said his father. "Now I understand that a minor cannot be held to his contracts in any case, unless he has received the consideration and then only if it is for necessities?"

"That's right, Dad. And another thing: The seller is bound to inquire and ascertain whether the articles are necessities; also whether or not the minor is already supplied for, if he is, they are no longer necessities though they are of such kind as would otherwise be so considered."

"What are necessities, then, in the eyes of the law?"

"What the minor reasonably requires in the manner of living and station in life to which he has been accustomed," replied Lawrence.

"What do you say about these things?" queried his father.

"That is a matter of fact in each case, and I don't know the chap well enough to give an opinion of his reasonable requirements."

At this juncture Nelson returned with the news that Claud Boys was, indeed, a minor, being but 20 years old.

"Well, I don't believe it's necessary for that chap to have all that expensive special equipment. I'll just cancel the order by wire and play safe," said Mr. Brown.

"There's one other small matter," remarked Lawrence, grinning.

"And what is that?" asked his father.

"My fee for advice and counsel," replied the young man.

(To be continued)



Injuries Due to Over-exertion

Workmen Who Overdo in Their Work and Suffer Physical Injury from Strains or Over-exertion Can Seldom Look to Employer for Compensation—There Are Important Exceptions Which It Will Pay Every Employer to Know

By Chesla C. Sherlock

It is not at all uncommon for workmen, who are intensely interested in their work, or in a great hurry, to over-exert themselves or attempt too much and thereby receive injuries which they ordinarily would not incur under normal conditions. Strains, ruptures or hernias are all the logical result of such over-exertion. These injuries are sometimes as powerful a contributing cause to the workman's incapacity for work as anything that could be called to mind.

Employers are naturally anxious to know what their legal liability in such cases is, particularly in those employments where workmen are peculiarly liable to suffer such strains or over-exertion. Industrial accident statistics place the greatest risk from this nature of injury upon those engaged in shops and factories—those required to move materials from one place to another, or those engaged in so-called "heavy" work, such as falls to the lot of every garage repairman.

Then, again, a strain or an over-exertion may be due to the fact that the employer has attempted to make his workmen do a task without sufficient help, one of such size that it overwhelmed them. The question arises here: Is the employer liable for his failure to furnish sufficient help to accomplish successfully the object he had in mind?

In a New York case, the industrial commission found "that while claimant was working for his employer at his employer's plant, and was assisting another employe in lifting a barrel weighing about 200 pounds, he was seized with a stroke of apoplexy by reason of the strain occasioned by the lifting of the heavy barrel.

"By reason of the apoplexy, that portion of the brain in which the apoplexy was seated degenerated. While the claimant gradually recovered from the motor paralysis of the left side, which immediately followed the apoplexy, there remained a deterioration of his mental faculties due to the degeneration mentioned. Be-

cause of this apoplexy and degeneration, the claimant was disabled from working from the date of the accident to the date hereof and is still disabled." The commission held that this was a compensable accident.

Where death is the result of the strain or the over-exertion, the court in Canada has said: "If an accident necessitates an operation and death ensues—even though it is not a natural or probable consequence—the death may, if the chain of causation is unbroken, be said to have, in fact, resulted from the injury."

Hernia or rupture has always been the subject of much controversy. This is probably due to the fact that medical men are not entirely agreed among themselves as to what causes hernia. There are two theories—one that it must be the result of an accidental breaking down of the abdominal walls due to strain or over-exertion, and the other that the hernia is an impossibility. It must always be the result of a disease or a predisposition to hernia.

The general rule of law on the subject has been fittingly stated by the Iowa Industrial Commissioner when he said: "Hernia may or may not be compensable according to the rules commonly observed in various jurisdictions. Compensable hernia results from specific accident or incident involving unusual condition, such as a strain or a fall or other fortuitous experiences which may be definitely described as to time and circumstance, and attended by demonstrations of distress at the time the injury occurs.

"In cases where hernia is of gradual development, where alleged injury is unattended by distinct incident and at a date that cannot be definitely fixed, and when the workman is able to continue his service, arbitration cannot be encouraged as giving promise of compensation."

One authority has said: "A hernia, in order to be entitled to any indemnity, must appear suddenly, must be accompanied by pain, and must immediately follow an accident. There must be proof that the hernia did not

exist prior to the date of accident."

The employer cannot be charged with the payment of compensation in cases where the hernia has been received in such a manner as to render the workman uncertain of the cause.

If he cannot fix the time and the place and the manner definitely and to a certainty in the evidence, he has not suffered such a hernia as to entitle him to compensation. And since the great majority of hernia cases fall under this latter class, it is very seldom indeed that compensable hernia is met with in the compensation practice.

In fact, the same rule is applicable in the case of all strains and over-exertion.

It will be remembered that the compensation acts in the vast majority of the states do not compensate workmen for personal injuries but for "accidental injuries" arising out of and in the course of the employment.

It is not sufficient that the injury occur—it must have the accidental feature. That can come only when it is sufficiently apparent to make the workman and those around him aware of it.

If it comes merely as an after-effect due to unusual strains having no accidental features, to which the workman has willingly exposed himself, then there is no recovery of compensation to be had, however unfortunate the condition of the workman may be.

In line with this thought, it has been held in Iowa that death resulting from a ruptured artery was not accidental when a workman stood on a chair and reached out to close a window during a rainstorm, and did not slip or fall or lose his balance and nothing unforeseen occurred except the bursting of the artery.

But where the strain results in a "traumatic" or accidental and violent injury, producing incapacity and evident injury on the spot and accompanied by pain and distress, then it has been held that a compensable injury has been incurred which will render the employer liable.

Radiators—Methods for Their Repair

In This Concluding Installment of Article on Radiator Repair Work Instructions Are Given for Installation of Honeycomb Core in Tubular-Type Radiators—Several Kinds of Core Repair Illustrated—Finishing Touches

By Cloyd Osborn

To install a honeycomb core in a tubular radiator, remove the shell and any braces or pieces that attach the core to the tanks. On Fords, Fig. 6, remove the overflow pipe and two lower tank supports. A nail saw is now needed. With it the tubes of the core can be quickly sawed off close to the tanks.

On radiators with tapered cores, saw the tubes that you can get at, and cut the rest off with a thin wood chisel. The chisel can be driven straight down, cutting off a whole row of tubes at a time. Remove the short pieces of tubes from the tanks by heating with the torch. Take care not to loosen any seams with the heat. Melt and brush away all solder adhering to the tanks. Cut through the center of the row of holes running along the front of the tank, and into the holes at each corner.

When installing a 2-inch core, make another cut across the tube sheet $1\frac{1}{4}$ inches back, and remove the strip. This will give a quarter-inch of the tube sheet to be soldered to the core on each side. The cutting can be done with the nail saw or the well-sharpened chisel.

Clean and smooth the edges where cuts are made, and about the holes that will remain uncovered. Tin the edges, fit the tank to the core, and solder it fast. Either

can be done this way. It is sometimes preferable to cut out the entire tube sheet, and replace it with an entire new sheet of brass or copper. While this does away with the holes, it takes longer, is more expensive, and is not a more lasting job.

The overflow pipe must be soldered into



Fig. 7—Apply Acid With Round Acid Swab.

place, and the leaks all located and stopped so that they will never appear. Guarantee this work to your customer. Then, if he returns with a leak, don't try to blame him but give him service. Act like it is a pleasure to repair the leak, charge him nothing, hand him a cigar, and invite him to come again. This kind of treatment will take but a few minutes of your time, and will be your cheapest and best advertising.

The tank supports, described for repairing broken side-pieces, can be used. Set the radiator in the shell to fit them, so that when you place the radiator on the car it will look like a factory job or better. A patent lower tank for Fords—consisting of tank, supports, and hose connections all made in one malleable cast, to be soldered onto the honeycomb cores—has been put on the market. They also make your work last and draw attention.

One of the commonest leaks in the honeycomb type of radiator occurs where the tank is soldered to the core. To repair a small leak like this, heat it and brush away all dirt and solder from the place. Insert a putty-knife blade between the core and tank, where the leak occurs, applying the torch to the tank and blade at the same time.

Work the blade about to remove the dirt. Care must be taken to keep the heat away from the core, as too much heat will run the solder from the core seams. Apply the acid and brush with a wire brush, forcing the wires down between the core and the tank. Dash the acid away with water, dry with the flame, and apply the fluid. Again heat the surfaces with the flame and dab

over them carefully with a fluid brush.

If the surfaces tin well and the rest of the soldering along the joint of the core and tank is in good shape, proceed to close the leak. It is well to have long, bent instruments, that can be inserted through the hose connections or the filler neck, and press the tank down against the core while the soldering takes place.

It is often better to remove the tank entirely from the core. This may be easily done with the torch by applying the flame to the joint with the radiator standing on edge. Insert the putty-knife blade, or something similar, between the tank and the core, and move it down as fast as the solder runs out.

This will separate the tank from the core quickly. With the tank removed, all surfaces to be soldered can be easily cleaned and tinned. Then, when the core is again soldered into place, you will not worry about its not holding.

Many times the leaks will be in the face of the comb. In such cases, apply a little heat to the edge of the waterway where the leak occurs, and open the seam a little with a knife blade. Too much heat will cause the thin brass sidewall of the waterways to crack when the blade is inserted.

When the leaking seam has been opened, apply acid to the opening with a stiff bristle brush. Work it well down into the seam.

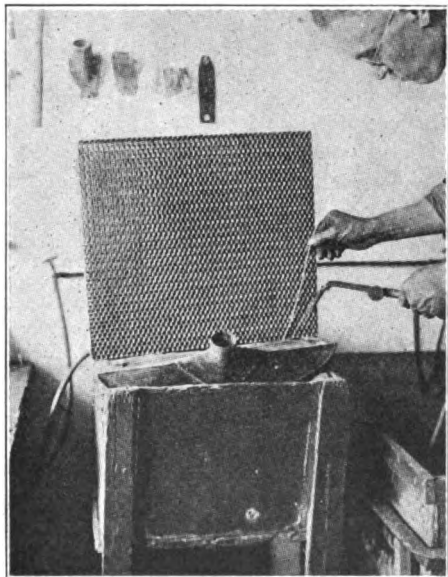


Fig. 6—Attaching Core to Upper Ford Tank.

torch or coppers can be used for this work. An excellent job can be done with either.

Where a row of tube holes remains, drop a copper rivet into each hole, and solder it into place.

With a little experience, a quick, neat job

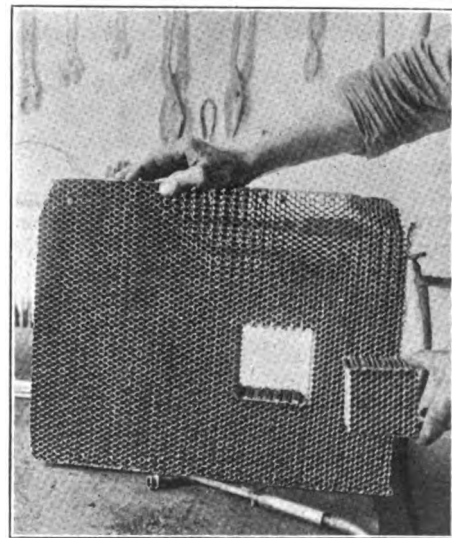


Fig. 8—Harrison Core With Section Cut Out.

Follow this with fluid, heat and solder. If the inside of the seam tins well, close it with a pair of slim end-pliers while you flow the solder with the reduced flame. This treatment, well applied, is permanent.

When the leak is in the cell, locate and

mark the cell. If the core has falsework criss-crossed between the waterways—such as the Harrison cores—insert the handle end of a small file into the cell and gently force the falsework back until you can have an unobstructed view through it.

Immerse again in the test tank and as-

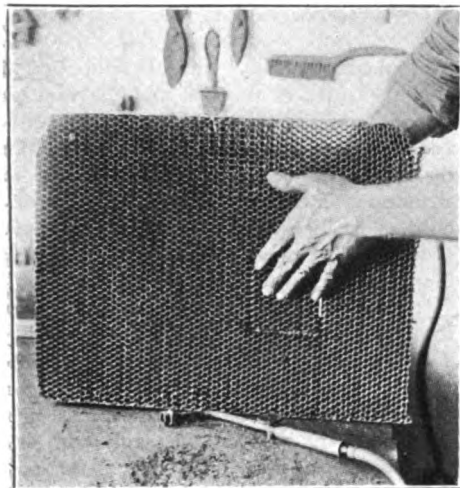


Fig. 9.—Fill the Sides in With Falsework.

certain the exact location of the leak. Apply the acid to the inside of the cell. This is best done with a stiff bristle, round acid swab, Fig. 7, which has been put on the market. Brush the cell well in the neighborhood of the leak and apply the fluid and the needle flame to the sidewall where the leak is.

When it is hot, which will be in a moment, slip the wire solder into the cell, letting the end stop in the flame. The solder will usually flow all about the place near the leak. A very little solder is usually enough; and self-fluxing is best here. Never try to run the cells full of solder. You gain nothing if you do and your work looks more like that of a mason's apprentice.

Only in the case of a leak deep in the cell, next to one of the tanks, is it permissible to fill the cell, and then only when the inside of the cell tins well on all sides.

In case the core has been jammed beyond repair, a section can be cut out, Fig. 8, and a new one put in. This is seldom necessary and requires a great deal of skill.

A square section should be cut out, preferably with a fine tooth hacksaw blade. Solder the sidewalls of the adjoining waterways together, with the waterways opening into the cutout place, and keep it as square and smooth as possible. Fit a new square of the same make of core to the place. Fig. 9.

Solder the sidewalls of the adjoining waterways together, as in the cutout place. Put the section into position, fit it as nicely as possible, and solder it into place all around the edges or faces of the core. This job can be so well done as to be scarcely noticeable, and will be entirely efficient.

Fig. 10 shows a Chandler radiator with Harrison core, wrecked by running into a

wire. The wire drew across the front from corner to corner, forcing the radiator against the fan with this result. This radiator can be straightened, a new section put in the damaged place, or a new core and shell will make it like new, for 50 per cent of the new price.

In some radiators the waterways are only lightly soldered to each other. A badly-jammed place in them can be repaired by removing the tanks, and separating the waterways through the core, where the injury occurs, or on each side of the injury. A new section of waterways the size of the one removed, or a section taken from another core of like make, can be installed. This job is probably not so difficult as it sounds.

A twisted or bent core can usually be straightened in a press. For blocking, use 2-inch pipe, and press the core back into shape. Do not attempt to heat in order to straighten, as brass becomes very brittle under heat. The core is not apt to leak

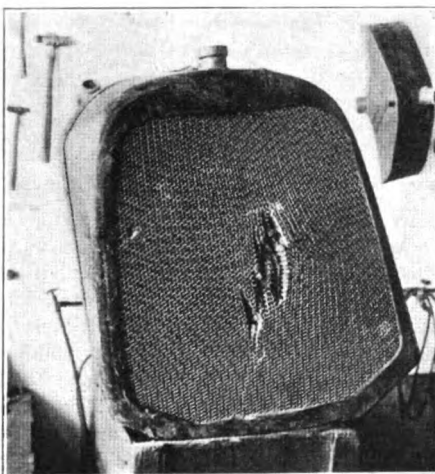


Fig. 10—Chandler Radiator, Harrison Core.

much from the twist, if it is not so bad that it can be straightened.

Small holes, jammed in the face of a core, can usually be straightened with a pair of long-nose pliers, the leaks stopped, and falsework built up to the level of the face of the comb. The skillful workman can make a damaged core look almost as good as new.

The different leaks in a radiator are often indicated by rich deposits of the famous brands of anti-leak solutions that are being urged on every automobilist whose radiator shows evidence of a leak.

We often find evidence of every known brand of the abominable stuff, as well as concoctions of ground cereals, eggs and milk, roofing cement, and chewing gum—compounded by the owner in a vain attempt to tide him over until he can sell or trade the car, as he always kids himself into thinking—congregated around one or two leaks that could easily have been repaired in the start.

Before trying to repair this sort of offended radiator, drain it well, plug the upper hose connections, and pour water into the

filler neck. If the water runs through freely, coming from the lower hose connection as fast as you can pour it in, you are safe to proceed with the repairing.

If it comes through slowly, or not at all, it may be well to induce the customer to let you install a new core in the radiator. As a last resort in such cases, solder the big leak or two to prevent the cleaner running out, and put the radiator through a process of corruption removing.

If the filler cap does not hold well, plug the filler neck or solder a piece of tin over it. Lay the radiator, front down, on a level place, and pour pure muriatic acid in through the hose connections. Pour in enough so that it will fill the core, when it gets soaked through so it can.

Plug the hose connections, the drain cock, and overflow pipe. After an hour, set the radiator upright, in another hour invert it, then turn it every 30 minutes until the acid has been in the radiator for half a day. If the acid runs freely from tank to tank after this treatment, drain and discard it.

Wash the radiator thoroughly by running water through it. Then, after repairing any leaks that show up under test, the radiator will give reasonably good service again. If clogging does not yield to acid treatment in a half day, drain out the acid and wash radiator out with fresh water.

Where water force is to be had, fit one end of a hose to the hose connection and the other end to the hydrant or other source of water force, and turn on the water, being careful not to let the force get strong enough to burst the tank. After washing, put the acid back in and add more to it. Treat for another half day, if necessary,

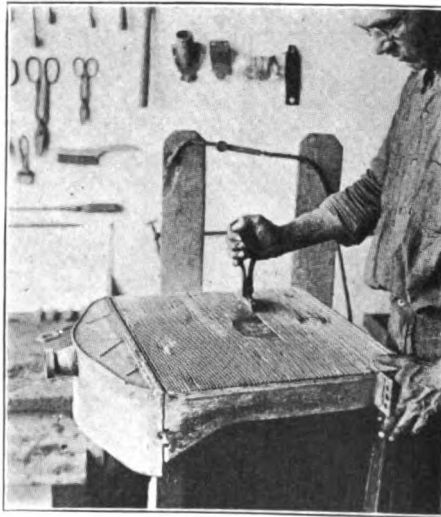


Fig. 11—Straightening Fins on Finished Radiator.

and wash again. Longer treatments with the acid are not advisable.

Another way to remove the clogging from a core is to boil the radiator in a tank of metal cleaner—such as okite—after which the most of it can sometimes be washed out.

Tubular-type radiators which have become clogged, can often be cleaned effectively. (Concluded on page 39)

A New Timer Talk by An Old Timer

Most Timers Are Good Timers When Given Attention but, When Neglected as They Many Times Are, Few Timers Give Good Service—Several Types of Timers Described and Methods Outlined for Their Care and Operation

By J. N. Bagley

It is not the purpose of this article to give the advantages of one timer over another, for most timers are good timers when proper attention is given them. Instead, a few suggestions are given as to

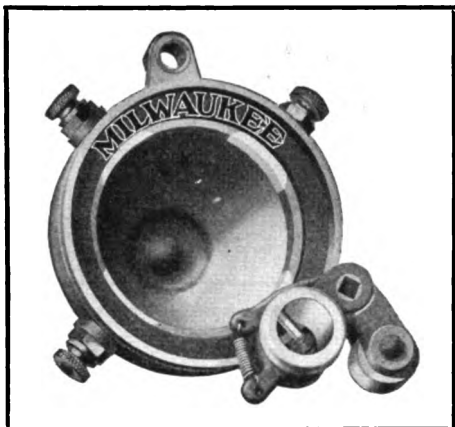


Fig. 1.—Type of Timer Long in Use.

the proper care of timers of the different types, as well as the manner of installing.

The timer is, without question, the most neglected device about the automobile, and yet on it depends practically everything so far as a smooth, even-running engine goes. The timer is tucked away in an out-of-the-way place, between the engine and the radiator, where it is not easily reached without getting covered with grease and dust. Most car users take a peep in that direction and instead of digging in to see if the timer is in good condition, they drop the hood and take it for granted that it is.

Many repairmen will look at every other part of the electrical apparatus before they look at the timer when, as a matter of fact, the timer should be looked after the very first thing. When one stops to consider the work the timers have to do and the little attention they are given while doing it, it is surprising that they render the service they do.

Only a short time ago, a customer came into the garage with a car jumping along in an irregular fashion that would disgust an Egyptian mummy. The mechanic diagnosed the case and pronounced the trouble to be chronic, incurable timer trouble. In other words, a new timer was necessary. The owner raved, declaring he would not stand for it, for he had paid for a new timer less than a year ago.

The mechanic asked him when he last oiled it. He said he had never oiled it—and yet he expected it to last a year without oil. The timer roller was worn half

away and the track in the shell could be likened to the tide coming in on the lake—that is, a number of large waves. The timer was a hopeless wreck. It was a good standard make of timer that would have rendered excellent service if it had been given half the care needed, and yet this man still complained, declaring he would not buy another timer like it.

The mechanic brought out six or eight different makes and gave the man his choice of the lot, but told him if attention was not given them occasionally, he could not expect service, regardless of make or type.

When the customer went out, the mech-

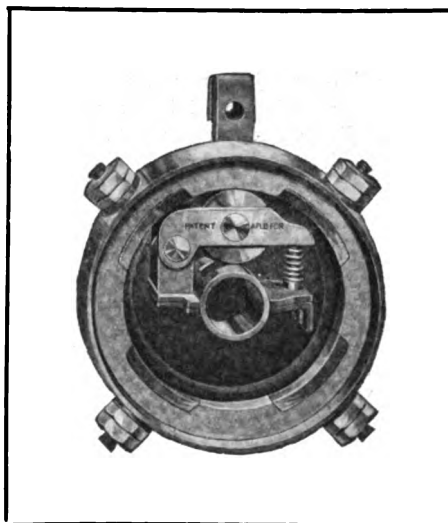


Fig. 2.—Shell of Steel and Fiber Insulating Ring Fitted Inside.

anic weighed the dirt and grime that was clinging to the timer—some had been knocked off—and it weighed almost a quarter pound. Think of a piece of machinery receiving such treatment and the owner complaining because it wouldn't last forever! But, when a look was taken at things about his farm—or rather the other fellow's farm on which he lived—you wouldn't wonder. Fences were down, the barn needed repair, farm machinery was setting in the field where it was last used, such stock as he had was poor and half fed. In fact, everything about him looked as though it had received just about as much attention as the timer on his car.

It is safe to say that close to 90 per cent of ignition trouble is due to the timer—not because of poor timer construction, by any means, but because it never receives any attention after it is installed. Properly cared for and regulated, most timers are amazingly durable, functioning perfectly

month after month and giving due warning before failing.

Some of the troubles that may indicate timer trouble are hard starting, misfiring, muffler explosions, etc., and these symptoms are many times taken for carburetor trouble, even by experienced mechanics. In most cases, it is best to remedy timer trouble by installing a new timer, as they are inexpensive and easily installed.

It is not the purpose of the writer to suggest the proper timers with which to stock but, in talking with many garage owners, he found that a stock of many different makes of timers is advertised and car users read the advertisements and want the timer that particularly appeals to them. Two large dealers whom I have in mind stock ten or fifteen different makes and types of timers, and, on asking them which one they sold the most of, they said it was hard to tell as they sold about as many of one as the other. I asked if they didn't think that one or two timers would be better than stocking with so many and they replied: "Certainly not!" I asked them why and this was their story:

"Practically all good timers are advertised, and my customers read the advertisements. If I don't sell them the advertised goods

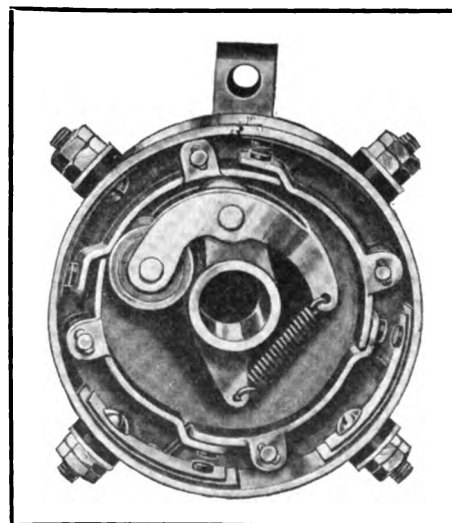


Fig. 3.—Contacts Pass Through Little Arms. Each Arm Carrying Tungsten Point.

someone else will, or they will buy direct and pay list prices. I stock the timers advertised and sell them." That's the story.

Care of the Timer.

The timer should receive attention at least once a month—that is, it should be removed and thoroughly cleaned and examined for wear, loose contact, springs,

etc. When reinstalling, a very good plan is to flush it inside with a high-grade, light oil, draining out all but the thin film that clings to the inside. The outside should be wiped dry.

This amount of lubrication will serve to lubricate it for some time when it should

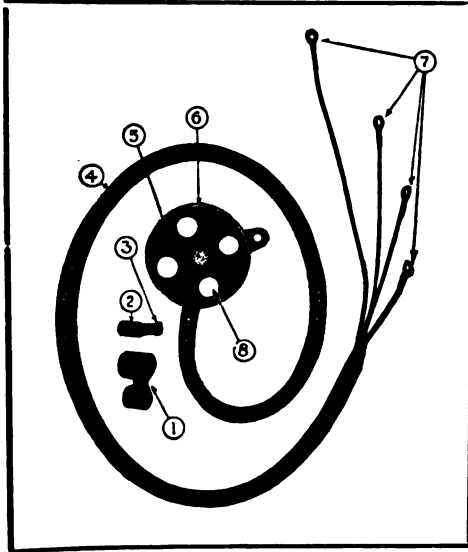


Fig. 4.—Brush Type of Contact Is Employed.

be removed, cleaned and the same operation repeated. If the timer gets no attention after it is installed, rapid wear will naturally result. A ridge will form on the race of the inner shell, interfering with proper ignition. Failure to clean the timer or care for it allows the working parts to become gummed up with oil and dirt, and may cause short circuits between the insulated contact points and the metal case.

Hard starting can be caused by light contact, due to either a weak spring or gummed, dirty film between the contacts.

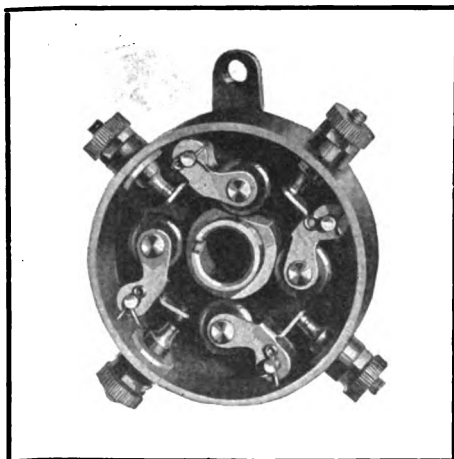


Fig. 5.—Ends of Contact Screws Supplied With Tungsten Points.

Proper and regular attention eliminates this trouble.

Misfiring at low speeds is due to the same causes as hard starting, while misfiring at high speeds differs inasmuch as it is usually caused by the race being worn wavy. When the roller or contact brush

travels at a high speed it comes in contact with the high points only. Muffler explosions also indicate the same trouble. Loose contacts quite often cause the engine to act very much as it does when the race is wavy.

There is no place about the car where quality, material and workmanship means more than in the timer, and most timer manufacturers have considered this when designing and building their timers. A timer, like every other piece of machinery, will last according to the care it receives. Many timers run thousands of miles while others run hundreds. The difference is in the care. At the time a new timer is installed, the dealer should school the user on taking care of it properly. Then, if the user doesn't have time or care to bother with it himself, he will make his regular calls to have the timer looked after just as he does his storage battery, and that is what he should do.

Some people may say this is needlessly "fussy" but it is not. It is important and necessary, for the timer is a vital part of an engine. Therefore, the owner must either buy more timers or take better care of the old ones. Just now we may say: "New ones are cheap, I'll buy a new one oftener." But other things are to be considered besides the cost of the new timer.

When the engine misfires and the car goes bouncing along, an uneven strain is placed on the crankshaft, clutch, driveshaft, axle, etc. Many times this results in costly repairs. To illustrate this, take a twine string, 10 or 12 inches long, place one end of it in each hand, pull steadily and note how hard it is to break it. Then take another piece exactly the same length and instead of a steady pull give one or two good, stiff jerks or "misfires" and note how easily it is broken.

When the engine is allowed to run missing and skipping, the vital parts are subjected to undue strain and they are liable to break at any time. Therefore, it is not only the cost of the timer that must be considered when it is allowed to run uncared for.

Good Contact Essential.

Anyone understanding the Ford ignition system will understand that there are two kinds of electric current in that system. The high-tension current, flowing from the coil units to the spark plugs and which carries a voltage ranging from 5,000 to 15,000 volts, will jump or arc regardless of a little dirt. But the current in the timer circuit is entirely different, as the voltage is only that of the magneto which ranges from six to 10 volts, or even less, when the engine is turning over very slowly.

This current is sufficient to cause the vibrators to buzz when there is no loss or poor contact. In case the contact at some point is only partially made, the loss of current, because of the poor contact, will be of such amount that the vibrators will not buzz and the engine will not start. For in-

stance, in case the brush or roller does not make firm contact against the contact shell in the timer shell, and passes over a thin film of dirt or gummy substance, sufficient current will not reach the coils to cause the vibrator to vibrate. Consequently, no high tension current will reach the spark-plugs

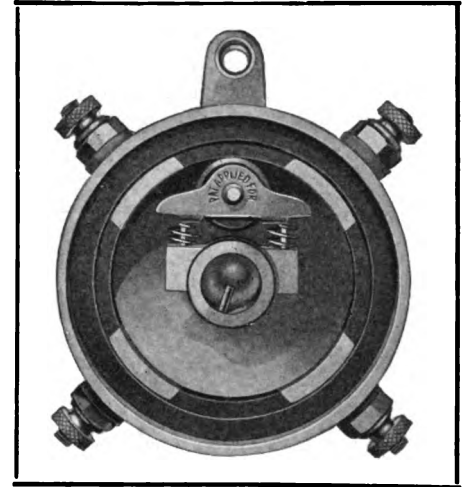


Fig. 6.—Brush Construction Unlike Other Roller Types Is Carried on "Bridge."

and, therefore, the engine will not start. The timer should be oiled with a very light oil as oil, in a sense, is a non-conductor. When a heavy oil is used, the pressure on the brush or roller may not be sufficient to penetrate or break down the insulating film or oil, and again no contact is made. Therefore, the oil used in the timer should be light and yet have lubricating properties.

It will be noted, at this time, that some manufacturers make timers where the contact is made by a roller, some with a brush or wiping contact, while others claim to

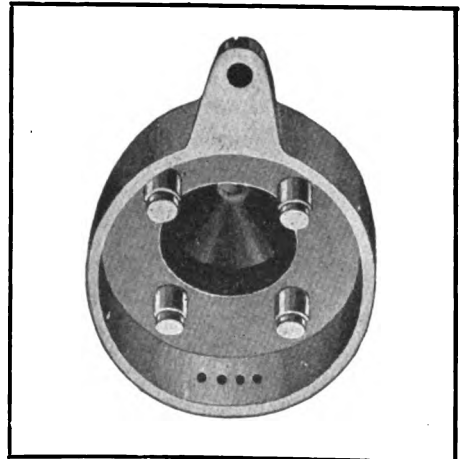


Fig. 7.—Shell Molded of Hard Rubber Has Four Brush Holders.

build timers where the use of oil is not necessary. Not all troubles are in the timer, of course. Therefore, the wires connecting the timer to the coil-box should be examined, for there are times when oil-soaked wires cause trouble. Oil tends to rot the rubber insulation and let the bare

wires come into contact with some metallic substances, "shorting" the circuit and causing one or more of the coil vibrators to buzz continually.

Installing the New Timer.

To many, the installation of a new timer

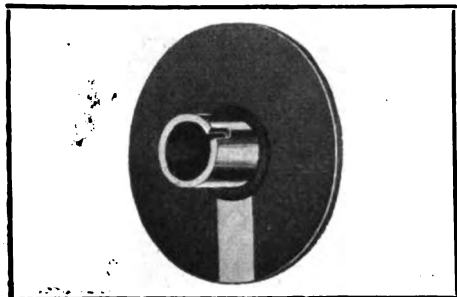


Fig. 8.—Rotor Has Metallic Strip Which Is Grounded to Hub.

and wiring is a sort of a bugbear, so to speak. But we will try and make plain the installation of a new timer and wiring so that anyone can readily understand it step by step. We will consider the beginning after the old system has been torn off and everything is in readiness. We are ready to place the roller or brush in position and, as we slip it on, we find that there are two positions in which it can be secured—one half over from the other.

The question is which position will be correct. It is easy when you do it this way: Remove the corner from the front set of valves, take hold of the starting crank and turn it over slowly until the intake valve on the second cylinder from radiator has opened and just closed. Now, place the roller or brush on the shaft with the contact on top, about $\frac{1}{2}$ -inch to left of the center as you stand facing the radiator. Slip in the little pin and place on the nut, and the roller or brush is in its correct position.

We are now ready to place the wires on the coil and the timer shell. As you stand facing the radiator and the timer in position, the first contact post to the left of the eye where the control lever is fastened is No. 1 and goes to the first post on the left of the coil-box extending through the dash. The next to the left is No. 2 on timer and the right coil post is No. 2. Since the firing order of the engine is 1-2-4-3, it will be proper to take the third post on the left of the timer and attach the wire to the last or fourth post on the dash. Now, the fourth on the timer to the third on the dash, and the job is complete.

Simple indeed, it is a matter of placing the wire on the timer as you stand facing it, beginning at the first contact left of the eye and placing them 1234. Reading on the dash as you face it left to right is 1243. Simply cross the last two wires and, as the wires are all of a different color, the matter of attaching them is a simple one.

In case the wires are all of one color, a battery and ammeter may be used to trace

out wires, or a battery and a light. When the proper wire is found, the current will complete the circuit.

When placing the timer rod, it is always a good plan to note the position of the timer shell. When in position for attaching, the range of movement of the timer is just as it should be when the rod is just the right length. It may be shortened or lengthened by a bending iron of some sort.

Now, placing the timer in a retard position as far as it will go with the rod attached and the lever on the steering column in the extreme retard position, take the measurement from the center of the end of the rod passing through the timer shell and the center of the bolt that holds the retarding spring in position on the timer, which should be exactly $2\frac{1}{2}$ inches. Other settings than this might result in damage to the engine, or a broken arm for the operator, and care should be exercised to get the correct setting.

As before stated, it is not the purpose of

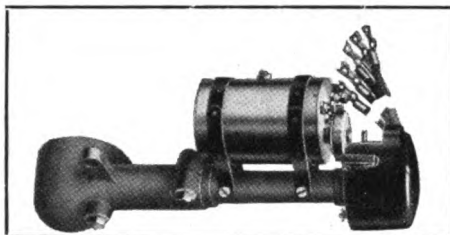


Fig. 10.—Battery Ignition System for Fords a "Cousin" to Timer Family.

this article to recommend any particular make or type of timer, as all timers, when given a fighting chance, will give the user a run for his money. The purpose of all timers, regardless of kind or shape, is exactly the same. That is, they time the ignition and make the contact in the low-tension system which is stepped-up in the high-tension winding of the coils and delivered to the spark-plugs when the piston is in the proper position for firing.

In Fig. 1 is illustrated a type of timer which has long been in use. It consists of few parts, made of steel and carefully ground and polished. The case—or shell as we term it—is a steel stamping, copperized and nickel-plated. Inside the metal shell is the insulated fiber ring, through which the four contact posts pass to which the wires leading to the coils are secured.

These posts or contacts are insulated from the shell by using a small bushing made of insulating fiber. When the timer is installed, it should be carefully oiled and all contacts made secure. Should trouble develop after a time, wash the inner shell out with gasoline to remove any dirty deposit on the track and see that the arm carrying the roller is not gummed so that it cannot reach the track with sufficient pressure to make a firm contact.

Fig. 2 shows a timer constructed after a slightly different design, the shell being of steel and the fiber insulating ring being fitted inside, through which passes the in-

sulated contact post. It will be noted that the roller or brush construction is somewhat different, while the contact is made by the roller coming in contact with the insulated post.

The tension of the roller against the track is taken care of by the coil spring which holds the arm with an even pressure while rotating. Should this timer give trouble, the race should be cleaned carefully as has been described, and the arm examined for free movement.

In Fig. 3 is illustrated a type of timer somewhat different from either of the foregoing. However, it has a shell which is very similar but does not have the insulating ring, the contacts passing through the little arms, each of which carries a tungsten point. The roller construction is very much the same—that is, the roller makes the contact as it passes from one arm to the other by causing the points to be quickly forced together and separated.

It will be noticed, in the illustration, that the contact-point arms are insulated from the shell and the roller assembly is the grounded member as in the two cases mentioned. Should trouble occur, the timer shell should be removed and thoroughly cleaned, for dust or grime coming into contact with the tungsten points will prevent the contact being made when the point arm is depressed.

The longer a timer has been in service, the more likely it is that there will be wear in the little bearings, and these should always be noted before placing the timer after cleaning. Should any of the parts show wear, it is better to replace the worn parts with new parts than to try repairing, for all movable parts are carefully ma-

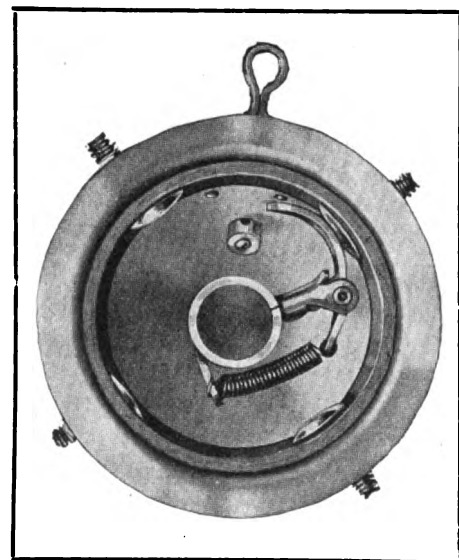


Fig. 9.—Brush Type of Contact Used Instead of Roller.

chined and ground to a correct size. When these measurements are altered, as they very likely would be in repairing, etc., the results would not be at all satisfactory. Timer manufacturers exercise great care

(Concluded on page 30)

Some Business-Stimulating Ideas

Garageman Tries Selling by Mail—Motor from "Junk" Pile Supplies Power for Time and Labor Saving Elevator—Unique Scheme for Selling Used Cars—Home-made "Trouble Shooter" Diagnoses Troubles with Certainty

Developed Mail Possibilities.

A garageman who sold some cleaners, polishes and other such things used on automobiles, and who had built up quite a trade in his own neighborhood, recently decided to work up the mail order end of the business.

He was located near a number of small rural places and, while these people came into his city from time to time, many did not come to his garage. Since the articles which he sold were delivering satisfaction to those who bought them, so that they came for more from time to time, he saw no reason why the same articles should not appeal in a like manner to the people who lived in these surrounding towns.

So he began to circularize them and to offer them, at attractive prices, the same articles as were sold at his garage. He made a strong point in his solicitation of the promise that the goods would be delivered promptly and would be the same as used by the city automobile owners.

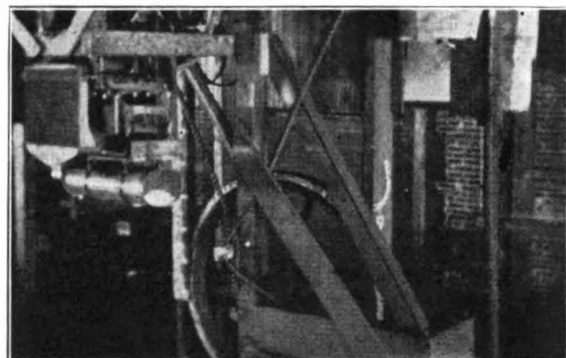
All business was done on a C. O. D. basis, and the goods were sent by parcel post collect. After a time, quite a business was developed by mail in those rural sections which surrounded this garage and it was found to show as good a profit as did his home trade.

Selling the Used Car.

The Moss-Pugh Motor Co., of Fort Wayne, Ind., recently staged a rather unusual sale on used cars, in that it advertised on a certain Saturday and Sunday some ten or twelve cars of varying makes and prices and conditions—all for sale at a uniform payment of \$100 down.

Under ordinary conditions, the down payments on these cars would have run all the way from \$100 up to \$250. Naturally this

Ford Motor Rescued from
"Scrap Heap" Furnishes
Power for Elevator.



sort of a sale attracted a great deal of attention and, as the result of this extra attention given the cars, the company was able to make a number of sales which probably would not have been made under ordinary conditions.

Isn't there a hint in this for other dealers who are anxious to find methods for moving their used cars?

What Do You Do With Scrap Heap?

The duty of the Ford motor shown in the illustration is to haul automobiles to the second story of a garage. It averages about 30 miles per gallon of gasoline, even though it did come from the "junk" pile—that is, a considerable part of it came from that source.

The elevator was once operated by hand and, owing to the arrangement of the weights, it had to be pulled down when empty, and, of course, pulled up when loaded. It was a real job until they installed the motor. Then it was "easy money." The saving of time and labor has been considerable.

The big wheel is five feet in diameter and the smaller wheel two feet. At the ratio thus obtained low gear and reverse provide

ample power and speed at the lowest idling of the motor.

The most difficult problem one has to contend with in building the outfit is to provide a suitably driven pulley on the elevator. This problem was solved by using the regular rope-driven pulley wheel, on which six V-shaped blocks were fitted. The blocks were bolted into the rope groove of the wheel so that, in the event that something went wrong with the motor, they could be detached and the rope used until repairs could be made.

The smaller pulley was once a part of a separator. This was keyed onto a short section of a Ford axle-shaft, and the other end of the shaft—having been squared—was inserted in the motor in place of a universal joint. A rear-axle roller bearing in a six by eight block of wood, to support the shaft, completed the power plant.

Made Their Own "Trouble Shooter."

Parkin & Rumsey, specialists in battery, lighting and ignition troubles, Elgin, Ill., constructed their own test cart for electrical work with automobiles. Their apparatus, which they call a "trouble-shooter," has been in use for some months.

It has proved to be so certain and rapid in its diagnosis of many electrical ailments that it has become a matter of some mystery as to how the firm ever managed to handle its business prior to the installation of this particular equipment, which was built at only a fraction of the cost of manufactured apparatus designed for similar work. Several original ideas were incorporated by Parkin & Rumsey in the construction of their home-made device which will be of interest.

Briefly described, the "trouble-shooter" is a small, box-like contrivance, mounted on casters, which permits it to be used anywhere in the shop, or it may be wheeled out onto the sidewalk for use in diagnosing the troubles of a car that is in distress.

The "shooter" can be used with equal



Casters Permit Use of "Trouble Shooter" Anywhere in Shop—Equally Useful Day or Night.

advantage at night, since it is provided with a lamp for illuminating the dials of the several indicators installed on the top of the "shooter" case. An extension trouble lamp also may be plugged in quite independent of the car.

With this apparatus, it is possible to eliminate practically any portion of the electrical system of an automobile and substitute a like part from the test cart. It is possible to entirely disconnect the battery from the car, substitute that of the apparatus, and operate the car electrically with the "trouble-shooter."

The generating system can be connected up to the "trouble-shooter" to determine whether it is at fault. In this case, the current coming from the generator passes through the cutout shown in the drawing, and thence through a standard Weston automobile ammeter.

On the other hand, by opening the switch shown in the drawing, the current can be passed through the main instrument which, in this instance, is a Jewel instrument with three voltage scales and three amperage scales. In this way it can be determined definitely just what the output of the generator may be.

It often happens that the instrument on the car is in error. In such case it may be readily calibrated with this outfit. It is possible, also, to make tests on a battery without taking it from the car by putting it through a high discharge and taking voltage readings, or cadmium tests, at different stages of its discharge.

All sorts of instrument connections can be made instantly with this apparatus by plugging in with the test leads which are adaptable to double-contact receptacles. When wheeled alongside of the test bench in the shop, it may be used while running in generators that have been overhauled and the output may be adjusted as the requirements of the car necessitate.

More than 90 per cent of the tests necessary in the successful operation of a lighting and starting shop can be made with this home-made test cart.

"I have no doubt," states Mr. Rumsey, "that it has helped us greatly in a business way. A man who is in trouble with his car appreciates prompt and intelligent service. If he drives up to our place and we locate his difficulty through the use of the 'shooter' in just a few moments, he is apt to think of us when anything else goes wrong. In other words, he feels we know our business."

"The location of trouble in most instances is usually very simple, for we simply cut out one part of his equipment after another until we isolate it. To the man in trouble it doesn't look quite as easy as this—all of which, of course, is to our advantage. At any rate, he is pleased when difficulties are promptly remedied, and that is the chief thing."

A Tire Shop That Makes Business.

The Kerkhoven Tire Shop at Kerkhoven, Minn., is the most prosperous shop of its kind in the entire neighborhood. To be located in a town of not over 1,500 inhabitants, the shop certainly does a good business, for it gets most of the tire trade, not only within the town but also from the surrounding farm country. All the time the number of customers is increasing.

The boss of the tire shop handles only good tires that can be depended upon. The United States brand is his specialty. A prominent feature of his business is that he gives six months' free service with each tire sold. This service means that every cut, blowout, or other like damage, will be repaired without charge for six months.

The free service includes also tubes bought at the shop, if they are placed in good tires, but it does not apply to punctures caused by nails or other sharp things that will pierce the best tube and casing. With each tire purchased a ticket is given, bearing the sale number and the name of the dealer rubber-stamped.

The number is also noted in a book, with the date of the sale, so that when a customer wants some free repairing the record will show whether he is entitled to the service or not. The patron must bring his ticket and, as it bears the number, the purchaser's record can be looked up in a moment. If desired, the number can be painted on the tire, and the tire user will not have to bother with tickets.

Contrary to what might be expected, the tire shop is not called upon to do much free repairing, because any good tire nowadays will stand up perfectly for at least six months. There are occasional damages caused by stones and other sharp things, but these repairs do not amount to much.

The offer, however, looks good to the purchaser and he will not think of buying his tires except at the place where he gets the free service, especially when the price there is the same as elsewhere. Any car

user who happens to have the bad luck of getting a new casing damaged within six months, and gets it repaired free of charge, becomes a good advertiser for the dealer. Thus, new customers are constantly brought to the shop.

"Get the habit of buying from an exclusive tire dealer, who knows your wants and thinks of them," say the advertisements of the tire shop. And the claims of the advertising are backed up by service, for the shop has everything in the line of tires and kindred goods to fit out any bicycle, truck or passenger car.

Quick and satisfactory repairs are made at any hour of the day. The workmen look over the rims and remove rust and other matter that may shorten the life of a tire. Everything is done to please the customer. "Drive to our door, we do the rest," proclaim the signs.

The tire shop also takes old casings in exchange for new ones, and allows a little more than the rag peddler for the old tires, just to get the trade. Most of the casings taken in trade are sold for junk, but a few are repaired and sold to customers who ask for second-hand goods.

The exchange scheme draws much business, for most people believe that they get a bargain when they can trade off their old casings for new ones. As no better deal can be made at any other garage or shop in town, every car owner in the neighborhood, who knows of the tire shop, goes to that place when he needs tires.

"Alphabet" Advertising.

"An Alphabet of Recent Local Whizzer Car Purchasers" is the title of an advertisement recently published by an Indiana dealer. Under this heading, the dealer listed all the "Whizzer" car owners—although, of course, that isn't the name of the car he is handling—whose last names began with "A" and then those whose last names began with "B," and so on through the alphabet. The advertising was unusual and striking and made a strong impression on the surrounding community of car owners.

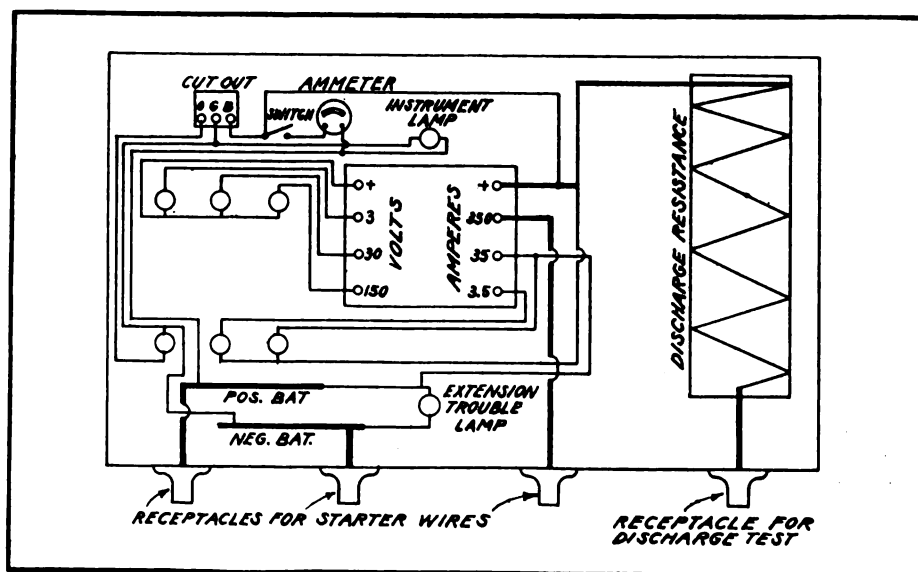


Diagram of Electric Circuit for the Home-Made "Trouble Shooter."

Welding, Cutting and Brazing Practice

Operator of Oxy-Acetylene Torch Should Observe Manufacturer's Instructions Carefully—Unfavorable Conditions Which May Develop and Precautionary Measures Which Should Be Taken—Misuses of Welding Torch

By David Baxter

The oxy-acetylene torch—or blowpipe as it is sometimes called—intended for welding and brazing purposes, is a very accurate instrument. When kept in good order, the oxygen and acetylene are mixed in it in the correct proportions to produce a fixed, steady flame of suitable dimensions for the size of the weld.

The welding torch usually consists of a handle at one extremity, where the gases enter, and a nozzle or tip at the other end where the flame issues. The gases mix in the handle of some types of torches, and in the tip or head of other styles. The welding tip is usually bent to an angle which is more or less open.

Due to the many styles now in use, it is obviously out of place here to attempt to go into details as to the mechanical construction and operation of any welding torch in particular. Printed instructions are furnished by each manufacturer for this purpose. Therefore, it shall be more the duty of this discussion to cover only the use and care of torches as applied to torches in general, together with citations of some of the misuses.

In the first place, the consumption of acetylene and oxygen should be as nearly equal as possible. They will be if the operator manipulates the torch according to the manufacturer's instructions—provided, of course, that the torch is kept in good order.

But there are some things which are beyond the control of the operator. One of these is the fact that the torch heats when working over a long, hot job. This heating has an adverse effect upon the flame. In fact, it sometimes causes the poor mixing of gases and premature ignition. The flame ignites before it issues from the tip.

Then, a flying bit of molten metal that is too hot sometimes lodges in the tip outlet and hinders the flow of gas. The treatment which the torch sometimes receives also lowers the efficiency of the tip. If the nozzle gets clogged, the welder should not attempt to clean it out with a stiff wire or other tool that is liable to enlarge the hole through which the gas escapes.

When this hole is enlarged, the gas mixture will not be correct in accordance with the design of the torch. If the torch does get out of order, it is better to send it back to the maker for repairs, unless the welder knows just what he is doing.

In manipulating or cleaning the torch, the operator should remember that it is an instrument of precision and should not be used as a hammer or scraper. Any in-

crease in the nozzle outlet brings about a decrease of velocity at the exit, which provokes a return of the flame into the interior of the torch and causes flash-backs.

The crusting of the tip by oxides or other particles of metal—which results in decreasing the opening—is perhaps impossible to prevent altogether. In the event that the opening is closed to such an extent that it is too small for the passage of both gases, the oxygen will get the preference which results in an oxidizing flame.

It is, therefore, important to watch the orifice to prevent it from becoming encrusted, but it is more important not to enlarge the outlet. The removal of the crust should be accomplished with a copper wire—never with a file or other hard tool if the tool has to be inserted into the outlet.

Sometimes particles of rust or bits of hose lining are carried into the interior of the torch and cause a partial obstruction with the results already mentioned. A simple remedy is to take off both hose

torch are opened several times in recurrent succession. This operation sweeps out the passages of the torch—blows them out backward, so to speak.

Or the operator may fasten the torch in a vise, open both valves, and then hold the oxygen hose to the tip while the gas is turned on and off several times in a rapid fashion with the regulator valve, as is shown in one of the illustrations.

The careful welder will not dip his torch in water with the pressure entirely off, because the moisture tends to oxidize or corrode the interior. This oxidization of the various delicate parts produces obstruction and derangement. In fact, it is poor policy to dip the torch in water, since the dipping tends to soften the tip and to cause the torch to get loose in every part if the practice is continued.

If it is necessary to cool the torch when working on long jobs, the oxygen valve should be left partly open. Then, the pressure of the oxygen prevents the water from entering the interior of the torch.

Oil should be kept off the valves or other parts of the welding torch. First, because, under certain conditions, oxygen coming into contact with oil forms an explosive. Secondly, because the oil may work into the torch—especially when the torch is hot—and find its way back into the hose where it may take fire and destroy the rubber tubing inside of the hose.

New torches are sometimes oiled or greased, and should be cleaned before using. However, it is better to avoid as much as possible the taking apart of any torch, as putting it together entails new regulating besides the extra wear on the parts.

In cases of bad working, and when the suggested methods of cleaning will not suffice, the torch should be returned to the maker for overhauling. This is usually the most economical procedure in the long run.

Besides keeping the interior of his torch clean and in good working condition, the welder who takes pride in his tools will keep the exterior clean as well. This sort of pride is usually an index to mechanical ability.

Another effect of overheating the torch on a hot job is the expanding of the acetylene and its arrival in decreased quantity. The flame becomes, little by little, an oxidizing flame. This is easily adjusted if the welder notices the change before it does any harm. This irregularity in the flame condition happens almost always at the beginning of the job when the torch first expands, so that several adjustments of the



"Don't Clean Welding Tip With File or Other Hard Instrument."

after shutting off the acetylene and oxygen at their source. Then connect the oxygen to the tip and turn on the oxygen, after charging the regulators to about ten pounds' pressure.

The oxygen is thus sent in a reverse direction. Then, while this pressure is on, the oxygen cock and the acetylene cock of the

flame are generally necessary before the flame is fixed and steady.

In cooling the torch in water, the operator should not only remember to leave the oxygen partly turned on but he should not forget to turn off the acetylene entirely.



"Blow Torch Out Backward With Oxygen Hose to Remove Obstructions."

Otherwise an explosive mixture may be formed above the water. In no instance should the torch be plunged into the water alight.

Backfiring, as it is called, is recognized by the sharp detonations. These, in some torches, are often very loud. While this is alarming to the beginner, it is not necessarily dangerous if proper steps are taken to avoid continued repetition. It is in the nature of a warning to the welder that something is wrong. The principal causes of this condition are defective flame regulation, bad condition of the torch, too much heating of the nozzle, irregularity of the flame, and the projection of sparks against the flame outlet.

In the majority of cases, the flame becomes normal after these manifestations. But if the cracking noises are continued, or are renewed after readjustment of the flame, the tip should be cooled by dipping in water as has been explained. The extremity of the tip should then be cleaned.

Some welders remove the cause of the flash-back by increasing the oxygen pressure. This will often stop the noises and will prevent the return of the flame to the interior of the torch, but it is not a good practice as it often results in irregular working of the flame.

Sometimes the crackling detonations are accompanied by a hissing noise, more or less piercing and very characteristic, while the normal flame disappears and is replaced by a smaller reddish flame which it will be found lacks normal power and from which

black fumes will be observed to escape.

The torch valves should be closed immediately and the causes ascertained. Because the burning gases heat the interior of the torch and incrust it with carbon which damages the interior workings of the torch, cleaning and cooling should not be put off any longer.

But, when the detonations are caused by the mere adherence of a bit of metal or oxide to the tip, they may be stopped by rubbing the tip briskly back and forth on the casting or on the table top. The offending bit may be scraped off in this way without stopping to shut off the gases.

This, however, is a poor practice, since the tip may be damaged beyond repair through the enlargement of its outlet. It may sometimes be justified—as in the case of an important weld which, at some critical point in the process, may require very prompt action and can not wait for the torch to be cooled and cleaned.

The modern welding torch, which is usually made of brass, is generally accompanied by a set of ten copper welding tips. These tips are for the purpose of making the torch adjustable to ten different sized flames.

These flames may in turn be varied in size by a skillful manipulation of the oxygen and acetylene. Thus, in reality, the welder is equipped with at least 20 different flames—that is, a flame with 20 different degrees of intensity, a range which is sufficient to cover any and all jobs that may come to the garage.

The conscientious welder will make use of all the tips according to different grades of work—the smallest size for the very lightest work and the larger for the heavier jobs. And, for each tip size, he will adjust his regulator valve as recommended by the maker of his particular torch.

These tips are sturdy looking but, in reality, are easily damaged. A dent in either end of the barrel will be sufficient to render some tips useless, while to shorten them on either end will result in totally destroying their efficiency. Tips should be cared for as much as any part of the welding outfit, since a torch with a defective tip is useless as far as correct welding is concerned.

A handy way to take care of the tips is to bore a row of holes, to correspond with the different tip sizes, along the edge of a shelf. Then make it a rule to keep the tips in these holes, even if a special shelf has to be arranged for the purpose.

The torch should not be thrown carelessly about, but should have a special rack or hanger. Or, a handy arrangement is to coil the hose over the gas tanks. Be sure the flame is extinguished before doing this.

Some operators use the torch to assist in turning a heavy job on the preheater. This method is wrong, for a torch is not a pair of tongs or a lever. Some use it to scrape slag or cinders off the weld, which is also a poor practice. The torch should

receive just as careful consideration as a high-tempered cutting tool or any delicate measuring instrument.

The hose—which is in reality a part of the torch—should also receive some attention. At least 15 feet of each hose should be attached to the average torch. Outside of the construction of this hose, perhaps the most important feature to note is the way in which it is attached to the torch.

It is of the utmost importance to have the hose securely fastened to the torch, which is true also of the regulator attachment. If fastened carelessly, it is likely to work loose and cause a fire or injure the operator; or, if the acetylene hose leaks at the tank connection, it is likely to ignite and seriously burn the operator.

When not in use, the hose should be coiled and hung up. When in use, it ought not to be strung across the floor but should be suspended overhead. If left lying on the floor, the hose is likely to be damaged through being trampled under foot, or to be burned by flying bits of oxide or metal. Instances have been known where the oxygen hose caught fire from the molten metal and was reduced to worthlessness immediately.

It is not the purpose of this chapter to give instructions for the manipulation and care of any one particular type of welding torch. The idea has been to give information that can be applied to any kind of welding instrument.

There are so many different torches on



"Cool Tip in Water Only When There Is No Time to Cool It Otherwise."

the market that it would be useless to give any fixed rules as to the dismantling or repairing of the oxy-acetylene welding torch, or to give a set of rules for handling the torch. The information should always be obtained from the manufacturer. And to fail to follow out the implicit instruc-

tions given is unfair both to the manufacturer and the welder.

The hose should be purchased expressly for the purpose of welding—especially the oxygen hose—as it may be called upon to stand tremendous pressure, sometimes by accident and sometimes during the regular course of a day's work.

In closing, it may be well to point out that the chief aim of this chapter has been to teach the welder to take better care of his welding torch, regardless of the mechanical details of the instrument.

The adjusting, regulating and manipulating of the torch will be taken up in a later article.

A TIMER TALK BY AN OLD TIMER.

(Concluded from page 25)

in selecting and machining the stock used in timers and with proper care, they are long-lived in nearly every case.

The timer shown in Fig. 4, is of an entirely different construction than those just mentioned, inasmuch as the contact is made in a different manner. Instead of the roller type of contact, the brush type is employed. The container is made to carry a small brush, which is held in contact with the face of the shell by a small spring placed behind it in the carrier. The timer shell is made entirely of aluminum, machined to size. The insulating disk is made of Bakelite, and the timer wires are contained in the insulated shell on the end instead of around the outer circumference, as was the case in the types previously mentioned, the timer and wires being installed at the same time.

Still another type of timer is shown in Fig. 5. This timer differs from all others mentioned, except that it has the shell supporting the insulated contacts the same as many others. However, the contacts are of an entirely different construction. The ends of the contact screws are supplied with tungsten points which come into contact with another on the arm when the cam strikes the roller.

It will be noticed that, as the cam passes under the roller in the arm, the points are quickly brought together and again separated, remaining so until the cam returns to the position for breaking again. The points are adjustable, should it be necessary. Dirt and gummed oil will affect the working of the timer by interfering with the contact of the points just as it would the magneto. Therefore, it should be kept clean & results are expected.

The construction of the timer shown in Fig. 6 resembles quite a little some of the types already mentioned, inasmuch as the shell is very much the same, as well as the inner ring of insulating material through which the contacts pass to the outer circumferences and to which the wires leading to the coils are made secure by the aid of the knurled nuts. It will be noted, however, that the roller or brush construction differs

quite a little from other roller types as it is carried on a bridge, so to speak, and is held in contact with the outer contacts in the ring of insulating material by two coil springs.

It is provided, like many others, with a small covered oil opening in the outer end of the shell where the end of an oil can may be inserted for oiling without removing the shell. Dirt and gummed foreign substance on the race will prevent good contact as the roller passes over, and it should be cleaned as already mentioned. All contact posts should be kept tight so that the contact segments will lie close in the insulated ring.

The construction features of the timer shown in Fig. 7 are different from any of those which have been described. It is made up of two principal parts—the shell proper shown in Fig. 7 and the rotor shown in Fig. 8. The shell is molded of hard rubber and has four brush holders which form an integral part of the shell. Each of the brush holders contains a carbon brush having a shoulder to which is fastened a phosphor bronze spring. The spring is held in place by a screw and washer, which passes through the shell and forms one of the binding posts of the timer on the front side.

It will be noted that the rotor has a metallic strip grounded to the hub. As this rotates it comes into contact with the brushes, the tension of which is controlled by the spring, and the contact is made. This timer should be cared for and cleaned occasionally to get results, just as all others, for no piece of machinery will run forever without attention.

In Fig. 9 we have a type of timer similar to those already mentioned, with the exception that the brush type of contact is used instead of the roller. As the brush is rotated by the camshaft, the contact is made by the brush dragging over the post extending through the insulated track. Should this timer fail to work, look to the spring tension or loose connections. An occasional cleaning and fresh lubrication is necessary to get the most service out of it.

Fig. 10 cannot, in reality, be called a timer while it is in a sense just as much a timer as any other. However, it is a battery ignition system for Fords and must be a "cousin" to the family of timers. It gets its current from the battery instead of the magneto, as does the timer. It is self-contained, having the step-up coil a part of the equipment and eliminating the dash coils. With the extra fixtures, it is easily placed and connected for use.

The wires shown go directly to the plugs from the high tension distributor located above the step-up coil. Therefore, the current makes and breaks in the low voltage state and is stepped-up and delivered to the plugs from the high tension coil, all in the device shown. Allowance is made for any adjustment that may be needed from time to time to take care of the wear which

would come from long and constant use.

All of the instruments mentioned are found in constant use among Ford owners and users, and the editor of the AMERICAN GARAGE & AUTO DEALER will be glad to supply information to readers concerning any of the timers and ignition outfits described, on request.

BOOK REVIEW.

AUTOMOTIVE REPAIR, INSTRUCTION MANUAL FOR REPAIR JOBS FOR THE GENERAL REPAIRMAN AND THE OWNER, by J. C. Wright, Chief, Industrial Education Service, Federal Board for Vocational Education; Formerly Educational Director of the Rahe Automobile and Tractor School, Kansas City, Mo. Published by John Wiley & Sons, Inc., New York, N. Y. 544 pages, 6 ins. by 9 ins., profusely illustrated, cloth-bound. Price, \$3.50.

This is a practical instruction book which will appeal equally to the owner of a car and to the general repairman. Part I contains full instructions for doing 118 automobile jobs, each one of which was carefully considered and finally selected because it represented the kind of work which is daily brought to the repairshop. Excellent illustrations make clear each step of the work and the entire book is written in clear, easily understandable language.

Among these 118 jobs are various types of chassis work, such as repairs of frames, springs, wheels, clutches and tires and installations of the various automobile parts; engine work, including valve grinding and adjustment, fitting of bearings, piston rings and bushings, fitting and replacing of gaskets, inspection and repair of oiling system, etc.; electrical work, such as repair of magnetos, magneto switches, light wiring terminals, cleaning spark-plugs, commutator and brushes on motor or generator, and testing and replacing mechanical parts of ignition system; "Trouble Shooting," including carburetor adjustment, engine troubles and engine noises; body and radiator work, such as washing and polishing car, repairing of doors, fenders, hoods, aprons or radiator covers, leaks in radiators, etc.

Part II covers the principles of construction and operation which the repairman and owner need to know in order to thoroughly understand automotive equipment. It also covers the principles of gas engine mechanics as applied to automotive equipment.

Not only is this new book a valuable and practical reference book for the car owner and repairman, but it is also a splendid text book for the student, covering, as it does, all repair jobs common to the general garage.

In fact, this would be an ideal Christmas gift for the repairman, the car owner, or the chap who is "burning the midnight oil" studying how to become an expert automotive repairman.

Operating the Automobile Headlight

Workings of the Headlight Explained—25,000 Candlepower Obtained from 21 Candlepower Bulb—How Light Is Measured—Some Devices Are Made for Stopping Glare Only; Others Both Stop Glare and Rearrange Light on Road

By Robert Livingstone

The only way to really understand the operation of an automobile headlight, how it is constructed, how it works, how it is adjusted, etc., is to first learn a few of the fundamental principles of light.

They are not nearly as formidable as one might think, and the satisfaction of having a line of information that most service men lack will more than repay one for a little study of the subject, even if the coming demand for better driving light by the public and by the legislators did not point a way to profit in headlight service.

Light Distribution From a Small Source.

If you hold a lighted headlight bulb up in the air, the light is thrown in all directions—up, down, and to all sides—with about equal intensity. Light is thrown toward any point from which the white-hot filament is visible.

The farther away from the bulb you get, the weaker the light becomes, because the original energy coming from the little filament is distributed over more and more area the farther it gets away from the filament. It is something like a charge of shot from a gun, that would tear a hole in a plank at a foot from the muzzle of the gun but which, at a little distance, scatters over a comparatively large circle each square inch of which may receive the impact from only one shot.

Right at the beginning it is a good thing to know that the intensity of the light decreases "in inverse ratio to the square of the distance from the source."

Put in ordinary language, that means that the same amount of light which would

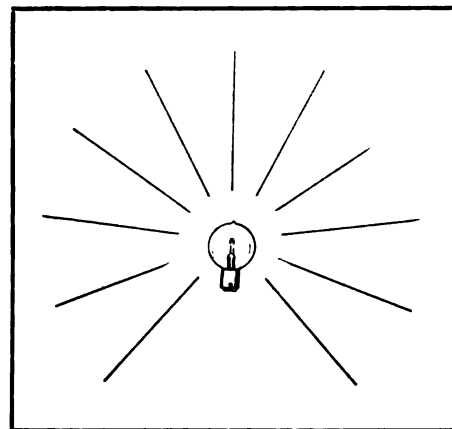
cover a card one foot square and placed one foot away from the light would be spread over four square feet of a card placed two feet from the light, or over nine square feet of a card that is three feet away. That is, the light per square foot on card B in the illustration is only one-fourth as strong as on card A, and the illumination on C is one-ninth as strong as on A.

Measuring the Strength of Light.

The strength of a source of light, such as an electric bulb, is measured in "candlepower," while the amount of light that such a source throws on a surface like a wall or the road would be expressed in "foot-candles."

The first term, "candlepower," comes from the old days when the strength of a light was compared to the light from a candle that was carefully designed to burn a certain amount of wax per hour. Nowadays we use a calibrated electric bulb and measure the current it consumes. A "foot-candle" is the strength of illumination on a surface one foot distant from a bulb that has a strength of one candlepower.

With proper instruments, it is as easy to measure the strength of the light an automobile headlight throws in any particular direction as it is to read time from a clock. The apparatus consists simply of a case about the size of a small camera in which are contained the standard bulb, a battery to operate it, and a rheostat and voltmeter for regulating the strength of the current and keeping it constant as the bat-



Light Thrown Toward Any Point From Which White-Hot Filament Is Visible.

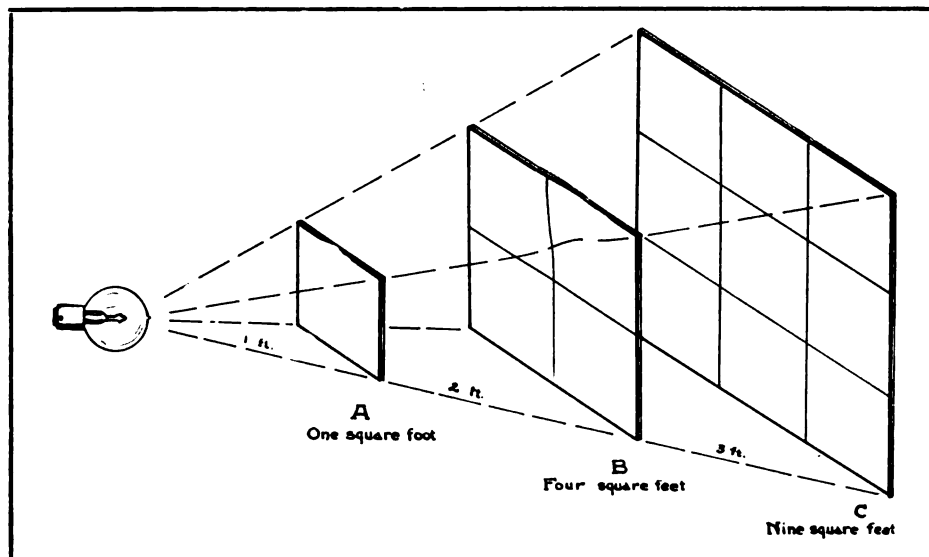
tery wears down from use. In front of the bulb is an almost-transparent disk surrounded by an opaque white background.

The light to be measured is allowed to shine on the disk and the white area that surrounds it. If the disk looks dark, it indicates that there is more light coming from the outside of the meter than from the inside. If the disk glows against the white background, it means that the standard bulb on the inside is giving more light than comes from the outside.

You can get the idea by putting a drop of oil on a piece of white paper and letting it soak in. Then hold the paper up to the window and the oiled spot will look brighter than the rest of the sheet. Turn around with your back to the window, hold the paper toward an electric light, and the oiled spot will look dark.

Go close enough to the electric light, keeping your back still toward the window, and at some point the oiled spot will be the same color as the rest of the sheet. That is the point where the light from the bulb balances the light from the window. If you know the candlepower of the bulb and will compare the squares of the distances of the bulb and the window from the paper, you can figure out the candlepower that comes from the window.

In one type of meter the intensity of the standard bulb can be changed by means of the rheostat so that the disk will show the same color as the background around it, and the strength of the illumination is measured by reading special calibrations that are put on the voltmeter. In another type of instrument, the standard bulb is moved nearer to or farther from the disk until a balance of illumination is secured, and the reading is taken from a

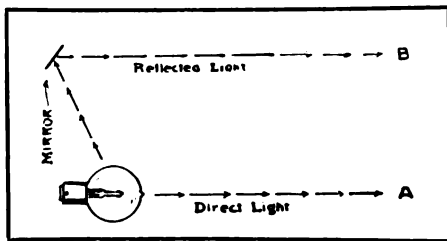


Intensity of Light Decreases "In Inverse Ratio to Square of Distance From Source."

calibrated scale on which the bulb moves.

A Simple Light Meter.

Possibly the simplest meter of all is shown in the illustration. In this outfit, the standard bulb is placed at one end of a chamber which has holes in a row like



Measure the Light Thrown by Mirror.

a flute, each hole being covered with a translucent material and all surrounded by the white background on which the measurement readings are printed.

When you hold this meter up to a light that is to be measured, part of the holes will look dark and part of them will be illuminated from the inside, the difference being accounted for by the fact that some of the holes are farther from the standard bulb than others.

All you need to do is look along the line until you come to a hole that matches the background and read the scale beside it. This is the type of meter often used by police departments for checking violators of headlight laws.

Of course, the distance at which the measurement is taken has to be considered and, in the testing of automobile headlights, the readings are usually taken at 100 feet ahead of the car. These readings are expressed in "apparent candlepower" which means that, if a headlight tests to 25,000 apparent candlepower, it is throwing a light as strong as a 25,000-cp bulb without a reflector would throw to the same distance.

"But," you will say, "how do you get 25,000 candlepower out of a 21-cp bulb?"

25,000 Candlepower from a 21-cp Bulb.

That is a perfectly logical question. It looks a little complicated at first, but there is a reason. Suppose that we take our 21-cp bulb, throwing light in every direction, and a little mirror possibly a quarter of an inch square—just big enough to catch one reflection or "image" of the filament. Hold the mirror as shown in the illustration and measure the light it throws. You will find that, except for a small percentage of loss due to the mirror absorbing some of the light, the intensity at A and B will be the same.

Now, if we wanted to throw a long, straight beam of light, we could do it by surrounding the bulb with a multitude of such little mirrors, each placed at the correct angle to catch a reflection of the filament and throw it parallel to the reflections from the other mirrors. Some genius did this and discovered that if enough mirrors were used, they formed a curve

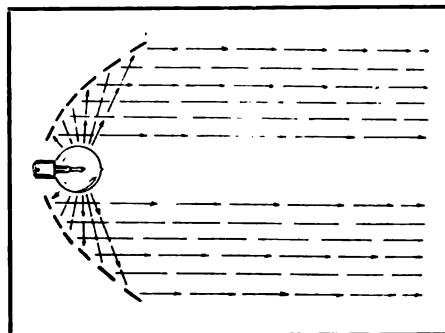
—the parabola—and that the position of the bulb shown corresponded to what is called the "focus" or "focal point" of the parabola.

So it is easy to see how, with the equivalent of thousands of little mirrors, each throwing the same light as the 21-cp bulb, it is possible to have many thousands of candlepower in the beam of light.

Why Parabolic Reflector is Used on Automobiles.

A reflector having a parabola for its cross-section was comparatively easy to spin or stamp out of metal and easy to polish, so it is the parabola that is used in automobile headlights today. Other sorts of curves have been tried in order to get good distribution of light on the road, but they all fail for the reason that it is practically impossible to make the reflectors accurately at reasonable cost.

It is almost equally difficult to get two bulbs that are alike as regards shape and location of the filament, both of which are



For Long Straight Beam of Light.

absolutely essential if such a reflector is to work properly.

Where Accuracy Becomes a Fault.

Of course, with a parabola that is exactly accurate and a filament that is only a microscopic point, we would have a fine searchlight but a very poor light to drive behind, because the beam of light from such a headlight would be the same diameter as the front of the headlight no matter how far it is thrown.

You couldn't very well drive behind a couple of 10-inch spots of light, because you have to see the whole road to be safe. Moreover, if the point of light happened to get out of the focus of the reflector even slightly, the light would go "blooy."

This defect of perfection comes out in the process of manufacture. The reflectors are far from perfect, and the filaments of the bulbs are of quite a measurable size so that the light

goes out of the headlight in an enlarging beam, cone-shaped. Even this is not ideal for lighting the road, because half of the light is wasted up in the air where it blinds other people, and because the light is widest far in the distance where you don't need a wide light and narrow. Further, the light is entirely absent close in front of the car where you do need a strong light.

Many devices have been designed to overcome these disadvantages. Most of them, unfortunately, have been made with the one idea of stopping the glare. Others both stop the glare and rearrange the light on the road.

To Stimulate Motor Travel Through Dealers and Salesmen.

The National Automobile Chamber of Commerce of New York has issued a bulletin in which it states that car makers have been asked by the American Automobile Association to help stimulate motor travel through dealers and salesmen.

This association has been advocating motor travel, especially long motor trips, and the touring bureau now asks the assistance of the car maker and the dealer, and, through them, the individual who actually sells cars to the public.

It has also been suggested that factory sales organizations direct the attention of dealers and salesmen to the services of the American Automobile Association, available through its general offices in New York and Washington and affiliated clubs, for road maps and touring information.

The National Automobile Chamber of Commerce urges its members to further this movement as fully as possible. Its advantage to the trade is obvious. Similar suggestions will be made to dealer organizations as well as to dealers in tires and equipment, the thought being to bring to the attention of car owners and others, tours that can be made.



The Sharp-Foot-Candle-Meter.

Glimpses in the Garageman's World

That Oil Stations May Be Such as to Add to the Beauty of City Streets Is Demonstrated in a Number of Eastern Cities—Colorado Automotive Store Keeps Patrons Interested and Informed Through Snappy House Organ

Oil Stations and Civic Pride.

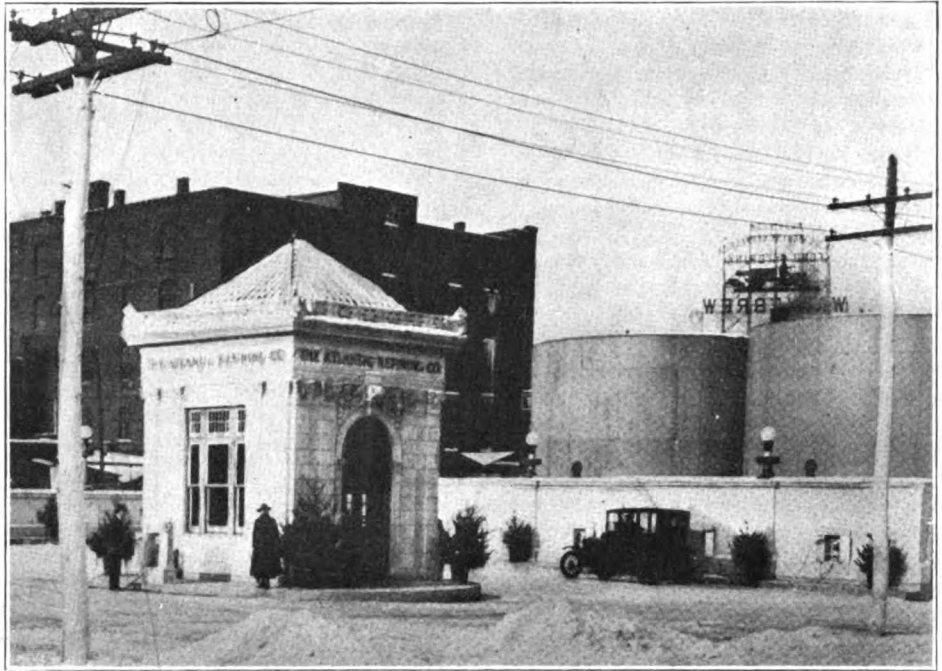
In Philadelphia, Pittsburgh, Scranton, Wilkes-Barre, Lancaster, Lock Haven, Erie, Providence, New Haven, Worcester, Springfield, Hartford, and other cities of New England where the civic movement is toward more beautiful streets, there are a number of oil stations that are not only far removed from the usual structure but actually are of attractive appearance.

It was the aim of the builders to present stations that would conform to the city's ideas of beauty and inspire others to do their share toward improving conditions. Their white walls and red-tiled roofs give them the appearance of being public places and inspire confidence in the goods and the service.

One ingenious, and at the same time slightly, feature is the addition of curb-stone pumps—a plan that does away with any possible objection to these necessary parts of the station. It will be seen that they are enclosed in neat white stands to which access is gained through a pair of doors that can be turned back to either side.

An advantage of a distinctive station such as these was in the fact that, when the company advertised, it could illustrate its advertisements and customers could easily locate the station by its unusual style.

In a western city, a man with means purchased for his son a station on a much-traveled road. It was in a location to



A Distinctive and Attractive Oil Station Inspires Confidence in Goods and Service.

get a large share of the local business. It was sold out after less than a year's trial. The son had overlooked the fact that service was the one thing that he would have to contribute to the business, his dad having supplied the rest. He put his pleasure and convenience ahead of the wants of his customers and prospective customers.

A request for water or air was taken as a request for the loan of a "twenty," with

a total ignoring of the fact that such an opening might lead to a new customer. The road was the daily route of thousands of truckgrowers and orchardists. He even refused to give prompt attention to calls for gasolene, saying that he was due to get ready for a "date."

Now, there is a new place across the corner. It is doing well. The two men in it know the history of their money and they are going to build a business on their service. The new owner of the young fellow's stand is improving his opportunities and the results are that the total business of the two is greater than before. This shows that live men get fat off the leavings of the indifferent men.

Good Advertising and Human Interest.

"Right on Main St.," in Lamar, Colo., is one of the busiest, most up-to-the-minute automotive stores in the country. And, being a live concern, it is to be expected that its house organ, which is published under the name of "The Hub Cap," should be known as the best and snappiest paper put out by a retail store.

Not many automotive stores can boast of a president and general manager who is a cartoonist and editor combined. Yet this is true of R. L. Christy. He is president and manager of the Lamar Motor Sales Co., Inc., 213 S. Main St., Lamar, Colo., and is also editor and cartoonist for The Hub Cap.

Customers say that The Hub Cap is a "winner." Along with some particularly



Another Oil Station Which Creditably Does Its Part Towards a "City Beautiful."

good advertising, the little paper carries several reader columns bearing such titles as: "Spring Center Bolts, by Crescent W. Wrench;" "Spring Squeaks, by Rose Pump;" a "Society" column by "Mrs. Beyring Scraper, Editor;" "Who Comes Here, by Ima Nutt," etc.

Clever cartoons add to the interest of the amusing paragraphs and articles, some of which are as follows:

"Mr. Pinion Gear traded in his old suspenders on a new pair at one of the local stores last week."

"Judge Valvelifter fell out of his Hope-mobile Sunday as he was on his way to church and broke several commandments and one rib."

"We thought that we were exclusive dealers in Dodge Brothers cars here, but found the other day that it has been Mr. Phillip Clark's business to dodge cars right on Main street for about the same period of time."

"One of our leading musicians, Mr. R. W. Wheel, who plays the drum in the Brake Band, recommends Raybestos brake lining. We have it in various sizes."

Some good promises which the Lamar Motor Sales Co. lives up to:

"Our shop and service station is especially adapted to take care of Dodge Brothers' cars and those who come here will always receive prompt service combined with expert workmanship. Those who have availed themselves of this service in the past are our biggest boosters. We shall appreciate your business. We also maintain a gas and oil station in the rear of our store and can give quick service at the prevailing prices."

"Our motto in our tire department is: 'We Put 'Em on and You Wear 'Em Off.' We handle the celebrated and well-known brands of Goodyear, Goodrich, Michelin and United States tires and take care of adjustments for our customers. We have never stocked the cheap, second grade tires, preferring to build our business with first-class lines of merchandise."

"Parking Place" on Idle Lot.

Philadelphia's municipal government recently began a drive to keep automobiles from being parked in the center of the city, where they had become a great nuisance on account of careless motorists abusing the parking laws. Of course, the innocent had to suffer with the guilty. Anyhow, this herding of motor cars off the thoroughfares wasn't a step that could make any garageman feel "peevish." Too many motorists had been trying to make a garage out of the street by tinkering with their cars at curbs and giving the garageman the "go-by."

The illustration shows one of these "open-air garages"—in fact, the first successful one of any size in the Quaker City. It was opened recently on a building lot on North Thirteenth street, in the heart of the heavy traffic district. Eventually a "skyscraper" office building will occupy the

site, but in the meantime—a year or more—it will be earning a neat sum of money.

An oil company's advertisement more than pays for the surrounding fence, which is virtually turned into a three-sided bulletin board proclaiming the merits of that particular lubricant. There are convenient gasoline, oil and air pumps.

The capacity of the fenced-in space here is approximately 100 cars. Trucks, also, are harbored in one side of this garage. The rate for all cars is 50 cents a day or a night—it is a "continuous performance" parking place. Huge carbic lights, with reflectors, illuminate the space after dark. Later, it will have an electric lighting system—probably arc lights.

There is a small brick building in one corner to house the manager, an air pump for free air and extra lubricants. The building is painted a bright yellow and the fence is painted yellow and dark green, announcing not only the name of the lubricant used but also the official name of the enclosure—the "Parking Place." The brick house is electrically heated.

While, as has been mentioned, the regular daily rate is 50 cents per car, regardless of wheelbase, patrons who park their cars here by the month get a rebate, especially those business men whose offices are in the vicinity.

Yes, the "Parking Place" advertises—in a way. Of course, there's the fence, but the management also distributes circulars, having them tossed into all the automobiles waiting at nearby curbs. The management also periodically distributes blotters through the adjacent office buildings and advertises regularly in the downtown theater programs.

The "Parking Place" is already doing a profitable business.

Service That Makes Sales.

The C. C. Coddington Co., Inc., Charlotte, N. C., distributors of Buick cars, aims to make its service department its greatest selling agent.

"The average cost of this service," an official of the company says, "does not equal the usual salesman's commissions.

but it makes a salesman out of every customer."

The retail department has a superintendent of service stationed in the shop. His salary is charged to sales expense. His duties are to assist the salesman in closing the sale and in making delivery of the new car to the customer. In this way, he becomes acquainted with every new car from the beginning.

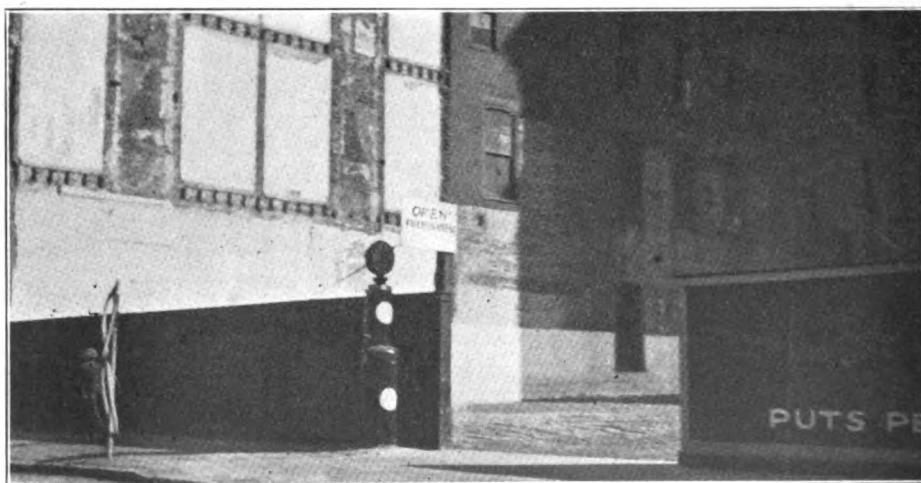
When the new car is billed, a monthly inspection record blank is filled out and sent to the service superintendent. This becomes his permanent record on the car and is carried in an index binder, with all information about the car service. Once a month the customer is notified to bring his car in for inspection, notice being given either by telephone or by mail. If trouble develops and the owner brings his car in before he is called, a record is made of the visit.

If the owner fails to report in answer to one call, he is advised on his next visit that these inspections are necessary to minimize the cost of his service and, inasmuch as he has failed to respond, a certain part of the liability under the guarantee must rest with him.

These monthly inspections include a general looking over of the car, tightening up loose parts, adjustments, etc. Of course, the owner is charged for new parts, oils, etc., used, unless the old parts are defective, in which case no charge is made, either for parts or labor, carrying out a replacement guarantee for 12 months by the dealer.

This service gives a complete record for 12 months of service cost—what the owner has been charged for, and what has been assumed by the company. The majority of the car owners, after 12 months of this service, ask to be continued on the list for inspection at the regular charge rate.

The system makes possible a minimum sales force. The service department sells more cars through the recommendation of owners than any one salesman could sell without this service and possibly more.

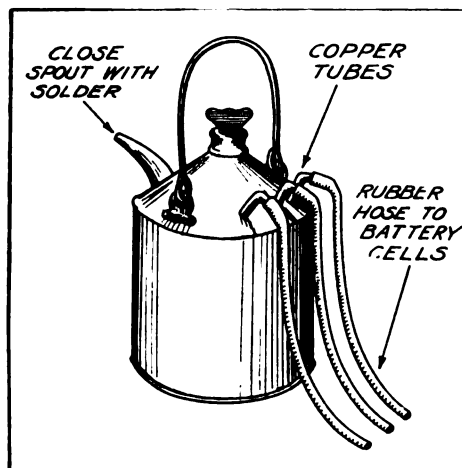


First, Successful "Open-Air" Garage in Philadelphia, Pa., Does Profitable Business.

Practical Hints for Shop Mechanics

An Effective Battery Steamer.

Secure a one-gallon oil can. Solder the spout shut. Drill three holes in the top of the can just large enough to insert a quarter-inch copper tube. Take three pieces of tube four inches long (six may



Gallon Oil Can Makes Battery Steamer.

be used) and bend them, without kinking, to right angles.

Insert these in holes a half inch and solder them tight. A washer cut from an inner tube will make the filler cap steam-tight. Slip snug-fitting, soft rubber tubing over each projecting copper tube, and long enough to reach the vent plugs in the battery.

The device may be heated by a kerosene or gasoline stove burner, a gas jet, a fire-pot, or an ordinary blowtorch. Where the torch is used, set the appliance on a metal frame and tilt the torch so that the flame will strike the bottom.

Fill the can half full, and when the steam starts from the hose, insert one in each cell of the battery to be opened. Place a bit of waste over each vent to retain the steam in the cell until all the compound is softened.—A. C. O., Neb.

Automobile Axle Stands.

The rear-axle housings, especially those that bolt together at the center, will serve many purposes in the commercial shop or in the private garage so they should not be sold to the junk man when they become unfit for further use on the car.

If a half of the housing is cut off just inside the brake and notched, it will serve well for a support under the axles of a car which must for some reason be held off the ground. Two such devices will prove very convenient as a support for the front axle when the wheels must be removed, or when the front end of the car is raised while a workman is busy on the under side of the engine.

Four half-castings will serve well to sup-

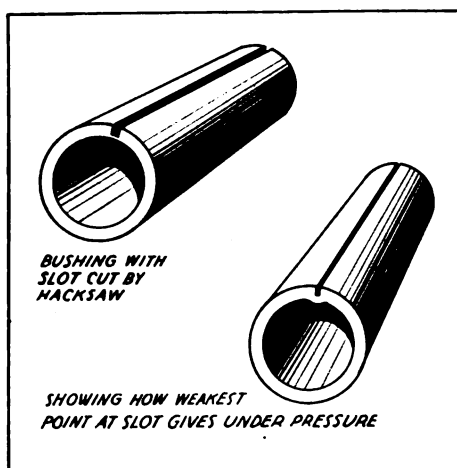
port a car during periods of dead storage when the car should be supported by other means than the tires.

One-half of the axle housing will serve well for a small revolving bench or work table, for a support for a grinding stand or small drill, for legs for a work-bench, and a dozen similar jobs.

If a series of holes is drilled around the housing and smaller pipe is placed within it, an adjustable stand can be easily made and, by fitting a pin at suitable holes in the stand and inner pipe, any desired height may be had.—G. L. E., N. J.

Replacing Brass Bushings.

It is a very common annoyance, in replacing worn brass bushings in such places as spring eyes, spring brackets, steering cross-tube connections, spindle arms, and the like, that the new bushing to be used is an exceedingly tight fit. After forcing



Safe Way to Put Bushings in Springs.

the new bushing partially into the part to be bushed, it is sometimes found impossible to budge it any farther without mutilating the bushing, even under an arbor press.

To get the bushing out again and cut it down to the correct size to press in easily takes considerable time and, if it is not already mutilated beyond use, in all probability it will be before it comes out, and another new one will be needed.

Loss of time, trouble and annoyance can be avoided by using a hacksaw and cutting a slot outside and lengthwise of all brass bushings, being careful not to cut all the way through the bushing, for it then becomes a split bushing and is very likely to work loose in the part bushed. But by leaving some stock and not splitting, the bushing retains its tightness in the part to be bushed.

At the same time, it gives it a weak point which, when the bushing is forced,

will give under the pressure, and the bushing will never get stuck so tightly but that it can be forced all of the way.

This is an especially safe and sure way when obliged to put bushings in springs and such places without removing them, and when one has to work under a car where an arbor press cannot be used.—D. J. M., Pa.

Hassler Shock Absorber Wrench.

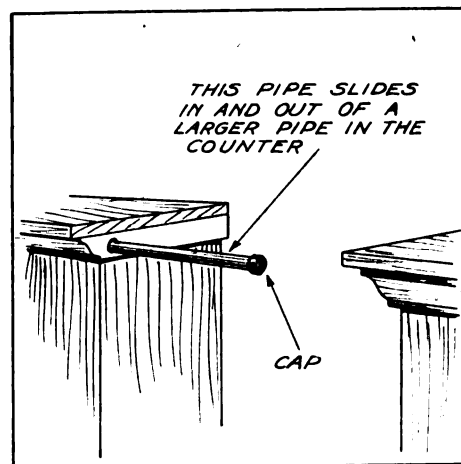
Equipping a Ford car with Hasslers is a lengthy and tiresome job, if one does not have the most convenient equipment. Especially is the tightening down of the clamp nut tedious, for it is impossible to use an ordinary speed wrench.

One garage, equipping many Fords with Hasslers, has speeded up the operation by the use of a special speed wrench. The socket, of course, fits the clamp nut, but the shank of the wrench is lengthened by welding in a long piece of iron rod. There is just room for the shank of the wrench to pass out between the fender and the tire. The wrench is equally desirable in removing Hasslers.—B. L. R., Mich.

Gate for Garage or Office.

I want to submit a suggestion for a gate for a garage or an office. I have one like the one described, and everyone speaks about it, as it doesn't take up much room and answers all purposes.

Take a 3/4-inch gas pipe about a yard long. The pipe is placed on the under side of the counter. Inside of the pipe, put a 3/8-inch pipe which slides out and in.



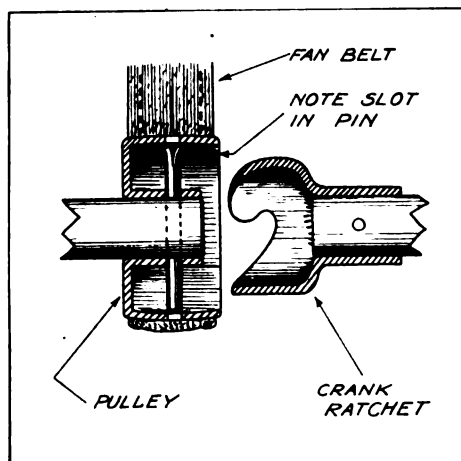
Pull Out Inside Pipe to Close Gate.

When one wants the opening closed, he pulls out the inside pipe. When he wants it open, he pushes back the pipe. There is no gate swinging to take up space, etc. This simple gate is practical and doesn't cost much. When pushed back, it is out of the way.—E. H., Ill.

Quickly Replaces Ford Pulley Pin.

A Ford pulley pin often loosens out, and usually the radiator must be removed to replace it.

A pin with a 5/16-inch slot cut in one end can be put in place and held by spread-



Cut 5/16-Inch Slot in One End of Pin.

ing. Several pins can be made up at a time and kept ready so that a job may be done quickly when a call comes in.—S. E. G., Iowa.

Giving Quick Crankcase Service.

During a rush of business, the floorman of the garage dislikes to take the time to pump and measure oil. If a number of pint and quart bottles are secured, a quantity of the oil may be measured out during slack times.

A funnel is not necessary if these bottles are used when giving crankcase service. The bottles should be distinctively marked for the grade of oil they contain. A dozen or more of these bottles in a rack on the service floor will prove a great time-saver to the busy service man.—B. L. R., Minn.

Prevents Rusting of Wheel Rims.

Rims which are not galvanized soon give trouble by rusting. The Japan soon scales off and then rust develops. This should all be removed with emery paper and the rims heated with a blowtorch.

While warm, apply beeswax to them. This will prevent rusting and eliminate further sticking of the casings. This is not a very long job when the tires have been removed, and the owner will be greatly pleased.—R. W. T., Mo.

Valve Refacing Grinder for Lathe.

A grinder is an excellent tool for refacing automobile valves but the average shop is not equipped with such a device, probably because it is comparatively expensive. However, any shop that is equipped with a lathe and an electric drill can fit up a very serviceable grinder in an hour's time.

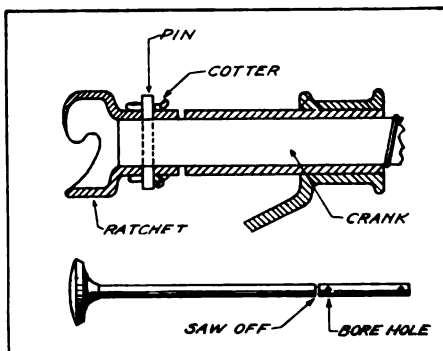
A bracket should be made that will enable the drill to be mounted to the carriage, and a small grinding wheel should be mounted on a small rod and mounted in

the chuck of the drill. The head of the valve should be placed against the center of the stock and the stem held in a quick-action chuck.

When the device is set up, the lathe should be started and then the feed so manipulated that the stone is brought into contact with the face of the valve at the correct angle. The surface of the wheel should be dressed down often and carefully, but if the grinding is done a bit slowly it will give excellent service.—G. E. S., Iowa.

Crank Ratchet Pins.

Much time is lost in trying to rivet a pin in place on the crank ratchet. An easier and better method is to obtain an old engine valve, saw off the stem the



Aids in Fitting Crank Ratchet Pins.

proper length, and then drill a cotterpin hole in the end.

The regular valve pin hole is now fitted with a cotter, the pin is inserted, and another cotter is fitted.—R. W. T., Mo.

Helps in Removing Crankcase.

The following has been found helpful in a garage: In taking out a Ford motor, it is difficult to remove the crankcase. As a rule, where the motor needs overhauling, the crankcase also needs overhauling.

Remove the transmission cover. Disconnect at universal joint, at radius rod and two bolts at front end. Now you are ready to take out the entire motor.

The same method may be used in taking the rear end down, or the dash and steering gear.—C. A. M., N. Dak.

A Handy Pick-Up Magnet.

Nuts, washers and many other small parts of machinery are often dropped into places which are hard to get into to recover the piece unless some special means is at hand to aid in the recovery of the missing part.

A slender iron rod and a strong horse-shoe magnet will prove a splendid combination under such circumstances. If the magnet is held against the rod, the ends will become magnetized and can be used to pick up a stray bit of metal from many places which are hard to get at in any other manner.—S. E., Conn.

Cleaning Spark-Plugs.

When an engine pumps oil badly, it is necessary to clean spark-plugs quite often. There is frequently one cylinder that is most at fault; the oil collects on the points of the plug and short-circuits the ignition of that particular cylinder.

The points of a plug that is fouled in this manner may be cleaned without removing the plug from the block. Disconnect the wire leading to the plug and start the engine. Hold the end of the wire as far away from the plug as is possible and yet get a spark to jump across to the terminal nut.

This acts as an auxiliary spark gap and in most cases will burn the oil from the points of the plug. After running the engine for a short time in this way, connect up the wire. In nine cases out of ten the plug will fire regularly.—R. L., Ind.

Test for Intake Manifold.

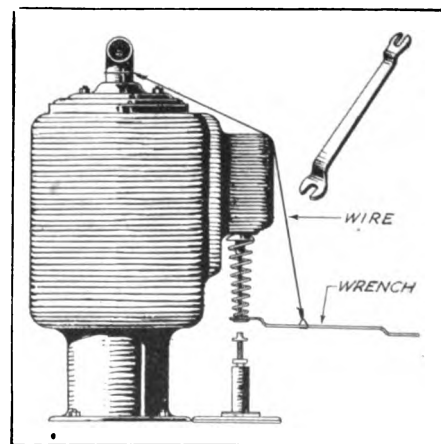
Automobile engines develop a rather peculiar manner of performing. This is often hard to diagnose when a leak occurs in an intake manifold. If a motor misses and sputters, particularly at low speed—regardless of carburetor adjustment—a test for leaky manifold should be made at once, especially if the manifold has recently been replaced.

The fan belt should be thrown off, or the air from the fan deflected from the manifold. A piece of punk, such as is used to light firecrackers, should be lighted and held near all joints while the engine is running. A leak will cause the smoke to be drawn into the manifold and thus the exact location of the trouble is indicated.

After the leak is located, it is usually stopped by tightening the joint or installing a new gasket.—E. G. A., S. Dak.

A Substitute for Valve Lifter.

I am sending you a hint for a substitute for a valve lifter. Many a person



Lifts Valve Without Standard Lifter.

who has not many tools takes a notion to grind the valves on his car.

Generally, he has no valve lifter. With the method shown in the illustration, he may lift the valves without a standard valve lifter.—E. F. S., Ia.

Readers' Questions and Answers

Bands May Not Fit Perfectly.

We have wondered a great deal why some Fords will not pick up in low gear like others. With new bands and drums some Fords will just barely move along, while others will move right out under the same conditions.

Would like for you to advise us about it through your magazine.—R. S. C., Okla.

It would seem that the reason for some cars responding more quickly than others, after new drums and bands have been installed, is the fact that perhaps the bands fit more perfectly in some cases than others. It usually takes a few days' running to form the band linings to the drums and wear them in.

In some cases, the bands may even require tightening before they will hold well after being worn in.

* * *

Grind in Ford Motor.

I would like some information. I have a Ford which had the oil drain dented in but not enough to make the magnets stick. I took the motor out of the car and, after putting it back, a grind developed.

When it was in high speed, if I rested my foot on the low-speed lever, it would stop. The sound was a humming grind. There were no marks to show where anything had been rubbing. Everything seemed to be O.K. except for the noise. Could a spring crankcase cause this noise and, if so, why only on high? It did not make any noise on any other gear.

When we put the engine together, every bolt-hole fitted perfectly. If you could give me some light on this, I would appreciate it very much.—R. L., N. D.

From your description of the trouble with the Ford car and the dent in the case located at the oil drain which you mention, we do not believe the crankcase is sprung or causing the humming grind of which you speak.

The metal in the case located at this point is quite easily dented, but it would take considerable force to spring the case enough to give trouble of the nature mentioned.

You do not say that the noise was noticeable previous to your dismantling the motor, and we assume that it was not.

We believe that your trouble is with the adjustment of one or more of the bands of the transmission, or perhaps the linings of the bands are considerably worn and so cause the noise that you have noticed.

It may also be advisable to inspect the high-speed clutch idler and yoke, to see if they are in good condition.

* * *

Rebuilding Fire-Damaged Cars.

I want to ask you a few questions. I think you can help me in this case. Anything you can do for me will be very much appreciated. The things I should like to know are as follows:

I bought several cars that went through

a fire and the temper is out of all the gears and bearings and springs. I would like to know what process I would have to go through to re-temper these different parts.

First, the Timken bearings; second, all the steel cut gears, transmission and differentials; third, how to get the temper back into automobile springs.

I have about 20 of them. If there is any way to get the temper back I can fix these up this winter. I have been using some case-hardening compound. I had fair success with the gears.—J. P. W., Mont.

Automobiles which have been burned in a building, and which were not partially protected in some manner, are not usually worth rebuilding. Many of the parts are so badly warped that it would require more skill and time to straighten them than to make a new piece. However, certain parts can often be restored to usefulness. Automobile schools will sometimes buy late model cars that have been burned and use them as demonstrating parts in the classroom.

The steel parts are made from hundreds of different kinds of steel, and each tempered or heat-treated according to a special process. It would be impossible to give any method whereby a part could be restored to its former usefulness unless the exact composition of the steel is known and

Get into the habit of asking questions! The more you ask about your business the more you will know, and the more you know the more money you can make. Do not hesitate to send in your questions, whether you are a dealer, a salesman, a mechanic, a service man, or a stockkeeper, they will be gladly answered.

Perhaps there is something you want to know about a certain car or truck or the specifications of some particular tractor or how to store repair parts, or increase the efficiency of your repair shop. We welcome queries about anything and everything connected with the automotive industry. When a quick answer is desired we will send a reply by mail, otherwise the answer will be printed in this department.

then, in many cases, the effect of the fire cannot be overcome.

Steel that has been burned or partially melted can only be reclaimed by remelting. Steel that has been overheated but not burned, can be partly restored by heating to a deep red and then cooling slowly in ashes or sand.

Steel bearings are often not harmed in a fire as they are usually well protected, but if they are soft, they are probably beyond repair in an ordinary shop. They are usually case-hardened and then ground at the factory but the grinding could not be done without special equipment and, as the hardening often warps them, they would not be serviceable without grinding. At any rate, the strain on bearings is so great that none but the best steel and best methods of heat treating will enable them to give service.

Gears are usually well-protected and can generally be restored to at least a fair degree of usefulness. They can be case-hardened or simple-hardened throughout, but, as the latter is less apt to distort the gear and is easiest done, it would probably prove the most satisfactory.

The web of the gear should be filled with fire clay so it will not be hardened. Then the gear should be heated to a dark red and quenched in oil. If it is not hard then, it should be heated a bit hotter and the operation repeated until the hardening temperature is found.

If the gears seem too hard, they can be heated on a metal plate over a fire, or in a large iron pipe, until their polished surface takes on a straw color, and then quenched in water.

The springs are often heated beyond repair as they are exposed. It is also a very hard job to get them to the proper shape unless a pattern can be had. They should first be heated to a deep red and then cooled slowly in ashes or sand.

Some spring steel is self-hardening, and if heated again to a deep red and allowed to cool in the air, will give good results. Other steel will respond better to the oil treatment.

In any case, a piece of the spring should be experimented with until its properties are determined. The spring should be heated to different shades of redness and quenched in oil or water and then broken so the crystals can be seen. The heat that produced the finest crystals should be used for this purpose.

Then the steel should be heated to this heat and quenched in oil. If this produces a hard spring, but one too brittle, the test may be repeated with slightly heated oil. After the proper temperature of the oil has been determined, care should be used to maintain this temperature as the pieces of work will heat the oil and soon have it very hot.

* * *

Alternating to Direct Current.

Could you please tell me how I can change alternating current to direct current so that a 6-volt current motor can be run off a 110-volt alternating current line?

Any information you can give me will be greatly appreciated.—H. C. C., Ill.

The only way in which alternating current can be changed to direct current is through the use of some kind of a rectifier or converter.

There are moderately priced converters for use in telephone exchanges which might possibly be adapted to your purpose, although they do not step the voltage down to anywhere near 6 volts. The direct-current voltage could be reduced by putting resistances in series with your direct-current motor. This, however, would increase the cost of operation.

Another method of operating the motor would be through use of a six-volt storage battery, which could be charged by means of one of the small rectifiers that are now on the market.

* * *

Compensation for Service.

We have a little matter on which we would like the advice of your legal department. The facts are as follows:

Owner brings in car for overhauling (Dodge). We took car down and found pistons worn, crankshaft flat and rough and camshaft very loose. We showed the owner the shape the parts were in and advised a new block, or at least reboring.

The owner brought in new over-size pistons, connecting-rod bearing, wrist-pins and bushings. We informed him he was wrong to put in new pistons without reboring, but he said we should go ahead and put the car together.

We set the engine up but it still knocked. The owner refused the job. He bought a camshaft, over-size, and new crankshaft but refused to buy a block.

Owner had a man of his own whom he wanted to set the engine up a second time and, as we were busy, we let him go ahead and we paid his wages.

The owner took the car out and the engine still knocked. He said we should have refused absolutely to work on the car without getting a new block and refuses to pay the bill or bring the car back.

The point is, are we entitled to compensation if the owner is worth it?—R. & M., N. Dak.

You state: "We informed him that he

was wrong to put in new pistons without reboring, but he said we should go ahead and put the car together."

Ordinarily, a garage repairman is an independent contractor and liable for the results of his work. If it is unsatisfactory, the owner of the car has the right to reject the work, but in this case it is very plain, as a matter of law, that the garageman was not allowed to exercise his own judgment, furnish his own materials and do the work in the way his superior knowledge and skill indicated that it should be done. The owner of the car intervened by furnishing his own materials and by directing how the work should be done, in spite of contrary advice from the repairman.

Therefore, the relationship of independent contractor did not exist in this case and the garageman does not stand as guarantor of the results of his work, and the owner of the car is undoubtedly liable for the value of the services performed upon the car, regardless of whether or not it is satisfactory to the owner.

The owner cannot set up his own wrongful act in bar of the right of the repairman to move for compensation, when the work failed to prove successful.

On the next point: Garagemen have a lien on the car for their bills so long as they retain possession of the car, but where they allow it to get out of their hands, the lien does not survive. It has been held that where the car is taken out and then subsequently brought back for another job, the first lien is not thereby revived. So you, as the garageman, have lost your right of lien on the car.

If the owner is financially responsible, we have no doubt but that you can recover the reasonable value of your services in an action of law, if the facts stand as noted in your letter.

* * *

Ford Motor Stalls.

The motor, in a Ford car which I have, stalls without any cause that I am able to

find. Can you give me any help on this?—R. L. W., Ind.

You may find that the difficulty is due to an overlapping of the first and second speed bands. This will result in a rubbing against the reverse band and may cause the motor to stall.

* * *

Lubricating the Ford.

I have a Ford car on which the lubricant on the rear axle works out and spatters all over the wheel. Can you suggest a remedy for this trouble?—L. V. T., Colo.

The trouble is probably due to the thinning of the lubricant in the rear axle after it has been in use for a considerable length of time.

We would suggest that you try drilling a small hole, about 3/16-inch, in the bottom of the axle housing on each side. The thinned grease that gets to the ends seeps out through these holes.

Be sure to place the holes sufficiently high to allow enough grease for lubricating the differential gears and do not place them too near to the end of the differential housing.

* * *

How to Lay Out a Gallon Stick.

To find the capacity of a cylindrical tank, multiply the number of gallons per inch of length for any diameter by the length of the tank.

Example 1: Find the capacity of a tank 12 inches in diameter and 40 inches long.

From the curve, B, the number of gallons per inch of length corresponding to a diameter of 12 inches is 0.49, and the capacity = $0.49 \times 40 = 19.6$ gallons.

To lay out gallon stick: Multiply each factor for depth of liquid corresponding to part of total volume for one, two, three, four, etc., gallons by the diameter of the tank. This gives the depth in inches from the bottom of the stick.

Example 2: For the same tank as used in Example 1, lay out a gallon stick.

For one gallon the decimal proportion of total volume of tank is $1/19.6 = .051$.

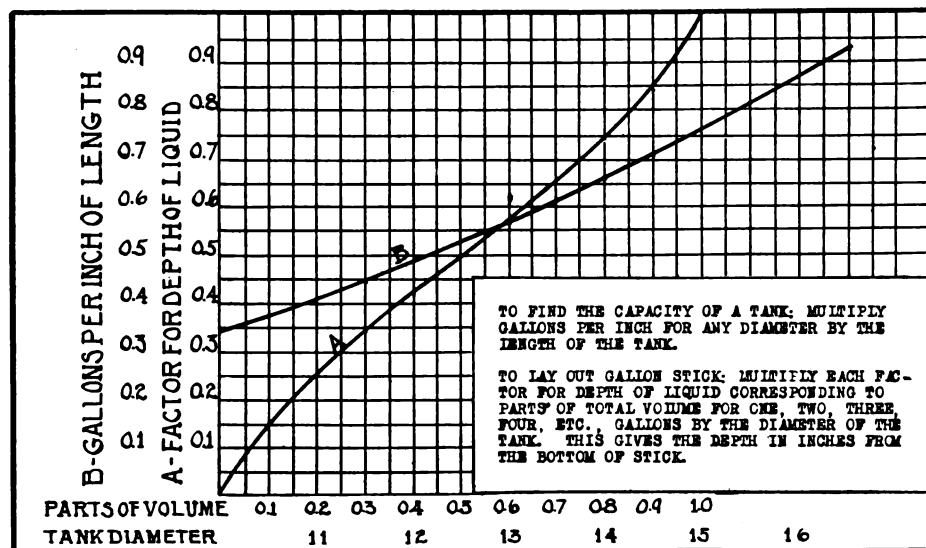
From curve A, the factor for depth of liquid corresponding .051 is equal to 0.09, and the depth from the bottom of tank to surface of liquid when tank contains one gallon = $0.09 \times 12 = 1.08$ inches or approximately $1\frac{5}{64}$ inches.

For two gallons, part of volume = $2/19.6 = 1.02$.

Depth factor = 0.15 and depth from bottom of tank to surface of liquid when tank contains two gallons = $0.15 \times 12 = 1.80$ inches, or approximately $1\frac{51}{64}$ inches.

For three gallons, depth from bottom of tank to surface of liquid, = $0.213 \times 12 = 2.556$, or approximately $2\frac{9}{16}$ inches.

Make calculations for four, five, etc., to 19 gallons and then lay out dimensions on stick.



Curves for Laying Out a Gallon Stick for Cylindrical Tanks.

Radiators--Methods for Their Repair

(Concluded from page 22.)

tively by removing one tank or the other, and inserting a steel wire into the tubes, with a stream of running water always entering with the wire. The clogging will then be washed away. We have had to run a small drill with a long shank through some tubes before we could get the wire through.

A fin-straightening tool has been put on the market, with which the fins in a tubular-type radiator can be shaped up like new, Fig. 11. Always put the fins in this condition on any radiator, as the air will pass through more freely, and cool the motor more efficiently.

Always do the neatest possible work, and make the strongest joints you are capable of making. When the radiator has been put in this shape, wash thoroughly to remove all traces of acid, and paint it.

A radiator fin color for painting radiators has been put on the market. It has a dull finish when dry and lasts very well. Another color, which is handy and quickly prepared, is a thin solution of lamp-black and turpentine. Apply it with a brush or, better still, with an air spray.

Paint the entire radiator when it is of the tubular type. It will dry in a few minutes

and look like a new one. Paint only the tanks of honeycomb radiators black. When the cores are painted at all, it is best to use an aluminum paint, although this is difficult to remove in the case of a repeat repair job.

When ready to replace the radiator on the car, take from stock the new pieces of hose, the right diameters and lengths, and put them into the kit in place of the old ones. Paint the hose connections on both radiator and motor—also the hose—with the differential grease.

The connections will now slip into place easily and, when the clamps are properly tightened, a leak will seldom occur. If the clamp bolt is at all difficult to tighten, don't fool with it. Life is too short and contains too many stovebolts, at a cent or less each, to waste a quarter's worth of time, and risk profaning an otherwise perfect day.

If the clampbolts are difficult to remove, a hacksaw will quickly sever most of them, while a saw blade, with tape wrapped on it for a handle, will get the rest of them.

It is best to use soft radiator hose, as it will conform to the connections better, and is less apt to cause cracks in the tanks or in the solder about the connections.

Thick, heavy hose may last longer, but it may do much damage.

In placing the radiator on the car, it should be lined up with the motor. Do this by raising or lowering with shims of web or leather. Make the hose connections of the radiator and motor straight with each other.

When this precaution is taken, the hose will last longer, and there is less danger of a kink stopping any of the circulation. Always bolt the radiator into place. Then tighten the hose and fill with water.

Radiator repairing should be the most profitable class of automobile repairing. The average mechanic does not want to monkey with a radiator. He will wallow about in the grease and oil, replacing pinions, tightening bearings and such—and he is always ready to let the radiator man have the radiator work.

The tinner in the sheet-metal works also shuns the automobile radiator like poison. Because the automobile owner expects a guarantee from the radiator man, that the automobile mechanic cannot give, he should pay a higher price for the service. The skillful radiator man can safely give this guarantee and collect the extra pay.

The Will to Sell

How May Selling Be Improved?—The Author of This Article Replies That the Answer Lies Not in More Sales but in Better Sales—Getting "Back to Normal" a Process Involving Intelligent Forceful Selling Methods

By J. H. Mehan

Sales Mgr., Brunner Mfg. Co.

The Problem.

What is the matter with selling as now done? The automotive industry has expanded to gigantic proportions and it is passing strange that, in the face of such a glorious achievement, there is need for further selling. By any process of analysis, selling is expansion, so the past record testifies to selling success of high standard.

Perhaps, then, it would be more precise to state our need as *better* selling. We require better selling—but we seek standards on which to judge selling so that improvement may be recognized.

We need less carping and less criticism, or rather, we need these elements directed at self instead of neighbor.

We speak of getting "back to normal" without knowing what we mean by the term. A known sales volume was reached in a peak year and at this juncture total sales are running generally about 50 to 80 per cent of the sales for the same period of the peak year. This handsome volume of business is turning almost automatically, for it is universally evident, and quite generally granted, that there is too little intelligent, forceful selling work being done.

In the article which appears on this page, we have attempted only to present an abstract of the complete article "The Will to Sell," which is being issued in pamphlet form by the Brunner Mfg. Co., Utica, N. Y.

But, in these few paragraphs, we have endeavored to put some of the pith and forcefulness with which this unusually interesting booklet is "chock-full." It is convincing, it is logical, it is inspiring. Salesmen and dealers alike will find it profitable reading.

"There is a way out of every forest, no matter how bewildering. Sales Promotion is our path and the Will to Sell the impelling spirit. In the sole hope that some readers will get a new thought or some new suggestions along these lines, this booklet is issued," says Mr. Mehan. And he proceeds to handle the question in eight concise and clearly-written chapters which he entitles: The Problem, The Answer, The Jobber Salesman, Cultivation, Equipment, Enter the Jobber Salesman, The Will to Sell, Conclusion.

A conclusion that really states the problem is this—sales can be much greater.

The Answer.

Increased sales demand more intensive selling. Better sales require keener activity from the four contributing units—the manufacturer, the jobber, the jobber salesman and the dealer.

The jobber salesman is the dominant factor among the four classes named. In the distribution of automotive equipment, the jobber salesman is 90 per cent.

The Jobber Salesman.

The jobber salesman of today is a business byproduct of a self-created demand which totals millions of dollars. He is the result of history's most spectacular development; namely, the automotive field.

In this weird sales field, merchandise has always been asked for rather than sold—and the immense demand for material has favored the mushroom growth of flourishing wholesalers who served the market rather than guided it. Salesmen for these houses have quite naturally followed the path of least resistance.

First, the salesman has not had time to make complete study of the individual customer. He knows more about "conditions",

competitor's prices, or most any subject than he does about his own customers.

Secondly, the salesman was not obliged to study his lines sufficiently to advise wisely in their sale or use, and should he attempt intensive assistance to any dealer, he would be unable to accord much genuine help.

Thirdly, the salesman has lived in an atmosphere of conversation about "conditions."

Normal is a state of affairs where every merchant scratches gravel to sell goods, to out-sell his competitor, to improve his establishment, to get ahead. Normal is a state of mind, not a state of "conditions."

Fourthly, the salesman has contended against softening influences. Years of buyer demand and inflated profits brought selling habits and facilities to a new standard.

Fifthly, the salesman is apt to treat his business as a monotonous grind and to regard his customers as intimate fellow-sufferers. The manner of approach is often flippant, and the next move a half-hearted inquiry, "Anything for me today?"

One salesman among those recently observed, even made this inquiry: "Nothing for me today, is there Bill?" What this may be is a question, but it is not salesmanship.

Genuine selling requires that you radiate respect for your line, its sellers and its users. Selling requires a forceful leading of your customer, not a whipped-dog, beggarly attitude. The true salesman knows the man he is leading, treats him as a fellow man, and makes it a practice to always feature something new to attract the customer.

Lastly, some salesmen have become careless. This looseness applies to expenses, reports, investigations and development work.

There has been little incentive to investigate and develop the smaller dealer who is reputed financially weak but who may, and often does, possess the personal ability that indicates his future success if he is given the right impetus at the right time.

What is said of salesmen applies with equal force to the entire industry.

Cultivation.

Viewed broadly, the market is large, elastic, and promising. More closely scrutinized, the market still appears attractive but successful cultivation must involve simultaneously two processes. One is the establishment of better credits, the other is the creation of intensified intelligent selling. It is the jobber's privilege—his duty—to work his field along both lines and his chiefest worry is the synchronizing and harmonizing of both programs.

It is impossible to lay down inflexible rules for strengthening credit that apply with equal force in every instance.

The jobber should, however, make certain before leaving any spot that his dealer student has established cordial relations with the local banker, has adopted collection poli-

cies that insure his money at monthly intervals, has safeguarded his physical assets with suitable storage means and ample insurance, has acquired intelligent buying knowledge, and has installed sufficient accounting system to keep simple but accurate record of his business progress from day to day.

Just a warning here against the attempt



"Better Selling" Rather than Increased Selling Our Present Need," Says J. H. Mehan.

to accomplish this credit bolstering by means of letters—it cannot be done. This part of the work necessitates personal contact.

Equipment.

Active sales promotion is the next step but an intermediate factor needs attention. How is the dealer equipped? He must have equipment to handle his work and to attract owners of valuable cars.

Equipment selected and installed should be governed by the retailer's aptitude for the several classes of automotive repair involving electricity, rubber repair, machine-shop work, etc. His locality and available trade must be considered. Above all, the existence of adequate equipment of various purpose in his neighborhood must be a prime factor.

Each dealer should have such general facilities as air service, oil and grease pumps, showcases—and just enough power machinery and hand tools to take care of the class of work he will get steadily.

Enter the Jobber Salesman.

Up to this point, the jobber himself has lent a helping hand but the critical selling question calls for the jobber salesman. This important person is now the man of the hour. It is the jobber salesman's golden opportunity, and, as usual, competent and energetic men will answer the call.

To insure the success of the sales campaign, the dealer's facilities must be attractively and efficiently arranged. We must provide him with a neat front with air line and with both gas and oil pumps conveniently located.

The Will to Sell.

Now "the will to sell." Every employee in the store and in the shop must be eager to sell and competent to sell. Each employee should work on a commission or bonus, in addition to his salary, so that "the will to sell" is sustained by concrete support.

A new line added must be studied by each retail employee, its features noted and its value determined. The retail salesman possessing this knowledge finds it easy to canvass in his mind's eye the regular patrons to ascertain which individuals might use the items. The established patron must be approached with every item he needs—and must be sold. The transient is also a prospect for more than he asks for, and his needs must be quickly ascertained and the selling effort rendered.

"The will to sell" is the energizing current and the retailer must in some fashion generate this spirit among his force and keep it flowing at high voltage.

Better understanding of the car owner will enable every retailer and his salesmen to recognize the absurdity of present methods and the possibilities of selling energy directed at the owner.

The doctor who wins your undying affection is the talkative type who recognizes your unusual ailment and takes a close, personal interest in your case. Likewise, the successful garageman treats in similar fashion his customers and finds excuse to talk frequently with every patron regarding the peculiarities of that patron's machine.

The car owner, who has acquired the habit of chatting with his dealer concerning car maintenance, is not apt to heed the lure of mail order prices and will not usually patronize the "gyp" or price-cutter who is a total stranger and who is not a mechanical adviser. Automotive business goes where it is invited and it sticks with the dealer who shrewdly capitalizes the fact that a man's car is closer to the man than almost any other possession.

Conclusion.

The simple fact that all commodities are selling below normal is the best proof that no one factor can be at fault. It is a question of better selling in every line and, perhaps, no field offers promise of such immediate success as this very automotive field, our own province.

But with the entire industry awaking to new methods for filling old needs, with new plans formulated and being formulated and with an able army of willing workers in the field, serving and anxious further to serve, there seems but one outcome. We are headed surely and directly to the "normal" which we cannot define but which we know is far greater than any records yet made.

Here and There in the Motor World

Demonstrating With a Vengeance— With a Lyon Bumper.

Automobilists in the larger cities are familiar with the method employed by the Metal Stamping Co., of Long Island City, N. Y., to demonstrate its automobile bumper. Some of those in smaller towns are not.

Usually the driver runs his car against a telegraph pole at a 15-mile clip, rebounds half way across the street, and then pauses while the idea sinks in that both the bumper and the car are uninjured. The telegraph pole is rarely taken into consideration. In a town of two or three thousand like Willoughby, Ohio, this should be done.

A recent issue of the *Willoughby Republican* tells of the experience of the Lyon resilient bumper demonstrator in that town. The charge up the street was made in a spectacular manner. The pole was hit fairly. The bumper stood the shock. So did the car. But the telegraph wire was broken and the pole slewed out of alignment. The demonstrator had to square up with the village for the damage done before heading westward.

Black & Decker Announce Manufacture of New Accessory.

The Black & Decker Mfg. Co., Baltimore, Md., builders of portable electric tools, have expanded their activities to include the accessory field. They announce that they are now manufacturing and selling a device known as the "cushion accelerator."

The device consists of a large polished aluminum pedal, which is hinged to the floor or toe-board of an automobile and provided with an air cylinder which operates over a piston attached to the toe-board. The bottom of the pedal rests upon the standard accelerator with which the car is equipped.

When the pedal is pushed down, the air in the cylinder is forced through a valve at top, and when the pedal is allowed to return, the air is drawn back into the cylinder. A spring-lock valve at the top of the cylinder makes it possible, by a turn of the thumb and forefinger, to restrict the orifice through which the air passes until the exact degree of cushioning desired is obtained.

It is claimed that a great improvement is effected in the even running of the motor, particularly when driving over bumpy roads and crossings, as the device is designed to eliminate the "fluttering" of the throttle.

The cushioning effect, it is said, makes it easier to shift gears. It is claimed that, in addition to permitting the motor to run evenly under all sorts of driving condi-

tions, this device eliminates a large amount of the nervous tension of driving in doing away with the necessity for maintaining a perfect balance at all times with the accelerator foot.

The device is arranged with adjustments, so that it can be attached to any car which now has an accelerator. It is understood that the Black & Decker Mfg. Co. will shortly announce a special Ford model, complete with all rods and levers for installing on Fords which have no accelerators.

Sterling Appoints New Manager of Sales Jobbing Division.

The Sterling Mfg. Co., Cleveland, Ohio, has recently announced the appointment of W. W. Dowdall as manager of its sales jobbing division.

Mr. Dowdall was formerly with the National Carbon Co., the last three years of his 11-year connection with that company being spent as general sales manager in charge of Canadian sales, at Toronto.

The Sterling Mfg. Co. is said to be the largest producer of dash-meters in the world, and has also given careful study to the development of practical testing instruments for service stations and electrical repair equipment such as the Sterling Ford



Watch Sterling Sales Climb Now!—W. W. Dowdall New Sales Manager Jobbing Division.

magneto meter and the Sterling high-rate cell tester.

Certainly the Sterling company is justified in anticipating an appreciable stimulation of jobber interest and business with a

man of Mr. Dowdall's recognized ability at the head of its sales jobbing division.

This company has enjoyed a healthy growth in the past ten years and plans for further expansion are now under way.

Wayne Oil Makes \$500,000 Purchase—Industry Enlarged.

That world leadership in the manufacture of water-softening and purifying apparatus has been assumed by the Wayne Oil Tank & Pump Co., Fort Wayne, Ind., through its purchase of the Borrowmire Company of America, Chicago, for \$500,000, was announced recently by William M. Griffin, president of the Wayne Oil Tank & Pump Company.

Immediate enlargement of the factory facilities of the Wayne Oil Tank & Pump Co., erection of an experimental laboratory; absorption of the Warriner Mfg. Co., organized at Fort Wayne a year ago; and centering of control of the zeolite mines of New Jersey in the Fort Wayne company are among the principal effects of the half-million-dollar transaction.

"The purchase enlargement has been fully accomplished for \$500,000," said Mr. Griffin, in disclosing the transaction. "By it, the Wayne Oil Tank & Pump Co. becomes the unqualified owner of the Borrowmire Company of America."

As soon as possible, it is stated, the machinery and equipment of the Chicago company will be moved to Fort Wayne. The company expects to erect factory buildings upon the 17-acre tract owned by the Wayne Oil Tank & Pump Co., at Canal St. and the N. Y. C. & St. L. railway, Fort Wayne, to house the new industry. One of these will be designed for the refining of zeolite, a mineral necessary in the water-softening process and which will be obtained from mines in New Jersey now owned by the Wayne Oil Tank & Pump Co.

Acquisition of the Borrowmire Company of America will, it is stated, mean no change in the corporate organization of the Wayne Oil Tank & Pump Co.

Homer T. Tate, president of the Borrowmire Company of Chicago, will join the Wayne Oil Tank & Pump Co., to assume direct charge of the manufacture of the water-purifying apparatus here. The present plant of the Wayne Oil Tank & Pump Co. is adaptable to the manufacture of a large part of the water-purifying equipment.

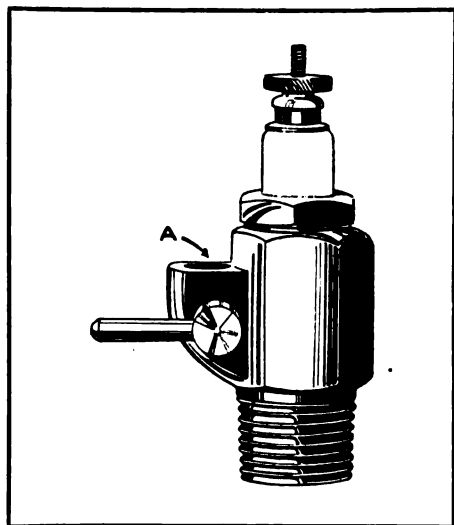
Departmental offices to take care of the water-softening equipment business will be opened immediately at 105 Monroe St., and substantial increases in the shop and office forces are contemplated as soon as accommodations are afforded for handling the new business.

Accessories—Dealers' Key to Profits

End Cold Weather Starting Trouble With E-Z Spark-Plugs.

Two Ford owners parked their cars near the street curbing and went about the business which brought them to the shop.

One returned for his car some moments



Priming Cup "A" Drop Forged with Shell.

before the other. It was cold weather and the little Ford decided to be "balky." Fordowner No. 1 cranked and cranked, fussed with the spark, gave it more gasoline, and then cranked some more.

Just then Fordowner No. 2 arrived on the scene. He walked over to his car, lifted the hood, dropped a little gasoline where it would do most good, gave one turn of the crank which made the engine hum, hopped in and drove away, leaving Fordowner No. 1 staring after him in amazement.

What did Fordowner No. 2 do? Simply opened the valves on his Premier clean E-Z prime spark-plugs, shot a few drops of gasoline into each cylinder—and was off.

The E-Z puts the gasoline right on the firing points where it catches the spark that fires all the gasoline and makes a big explosion to turn the engine over.

When the points become fouled, they can be cleaned without removing them from the cylinder. All that is necessary is to insert the cleaning rod—which is a patented feature of the Premier clean E-Z prime spark-plugs—and then clean the points as you would a pipe.

The priming cup is a solid part of the shell, drop forged with it, and is said to be absolutely indestructible.

Premier clean E. Z prime spark-plugs are good the year around. If the engine balks or misses, the compression can be tested by opening the valves, thus saving time.

Dealers and others interested will find

it profitable to secure price lists and full information concerning the attractive advertising matter and counter display carton furnished with each order, all of which may be obtained upon request from the Premier Electric Co., 3800 Ravenswood Ave., Chicago.

Exceptionally attractive offers to dealers are being made.

The Ezo Shock Absorber, a New Invention for Ford Cars.

That "experience is a good teacher," has been clearly demonstrated by S. A. Eure, of Ayden, N. C., in the new Ezo shock absorber and spring protector, for use on Ford cars, which he has invented and which is now being marketed by the Ezo Shock Absorber Co., of Ayden, N. C.

Mr. Eure, who has been in the automobile business continually for about ten years, realized the need of a device which would afford protection to the Ford car and aid in eliminating the wear on tires and bearings, side sway of the car, and broken springs.

Having driven a Ford car many miles and having broken many springs and cross members, he felt that there should be something to prevent this, so he set out to invent a device which would meet this long-felt need.

The Ezo is operated from the center of the front axle by means of two coil springs, a sliding bolt and an axle bracket. The axle bracket is attached to the front axle. On the top of the axle bracket is a coil spring which rests under the front spring, the lower end coming just above a hole in the axle bracket about an inch behind the axle. Through this, the steel bolt is anchored.

Thus, when the car hits a rough place, the jolt is caught by the top coil. When

the top coil tries to rebound, the lower coil catches the rebound and holds the top coil to its place by the use of this bolt, which pulls up against the bottom coil spring.

The Ezo has shown splendid results, it is said, under severe tests, and the manufacturer believes that, in this shock absorber for the Ford car, he has given the motoring public something which will make a great many friends.

It is claimed that, by eliminating jars and jolts, the Ezo shock absorber, when attached to the car, makes the breaking of a front spring almost impossible.

The best malleable iron securable is used

in the construction of this shock absorber. It is well made, carefully tested, and comes packed in a neat box.

It can be easily installed in a very few minutes, since there are only two clamps to be fastened on the axle and the bolt is fastened to the clip at the top. Every spring used in the Ezo shock absorber is oil-tested and the finest that can be bought, to insure long life.

The Ezo Shock Absorber Co., Ayden, N. C., manufacturer and distributor of the Ezo shock absorbers, will gladly supply prices and further details upon request, to those interested.

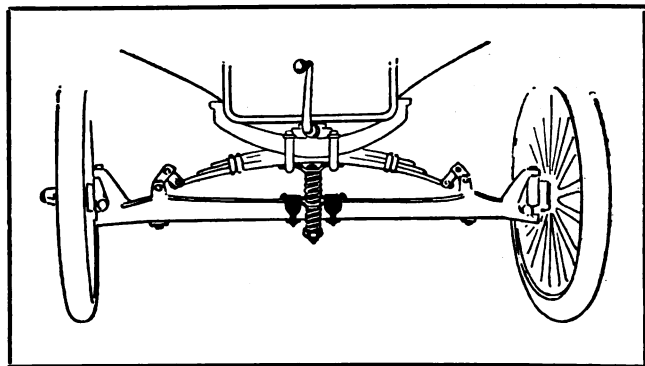
Young Company is Producing An Excellent Device.

The Thumb Accessory Co., of Sebewaing, Mich., has produced and is marketing one of those inventions which appear every so often and surprise people because of the convenience, utility and simplicity of the instrument.

This new device, called Uz-Ur-Thum, is a light-control switch, and consists of a black, vitrified, rubber switch-head, mounted on an aluminum arm which clamps to the steering-post at an angle that locates the switch-head just below the steering-wheel spokes.

The instrument can be put on in a few moments with simple tools, and at a position most convenient to the driver's thumb. He can retain his grasp on the wheel and, with a pressure of his thumb against the wing of the switch-head, can change his lights to the desired brilliancy.

A black-enameled cable, encasing the conductor wires, leads from the switch-head to the terminal panel where the ends of the conductor wires are tagged to indi-



Ezo Operated from Center of Front Axle by Two Coil Springs.

cate the proper connection to be made.

The instrument is inconspicuous when mounted and the black switch-head, black cable and aluminum arm are distinctive in appearance and look well with the other accessories of the control system.

It is claimed that this device eliminates one of the gravest dangers of night driving—the chance for an accident while the driver's attention is divided between driv-



Just a Pressure of the Thumb Gives Light of Desired Brilliancy.

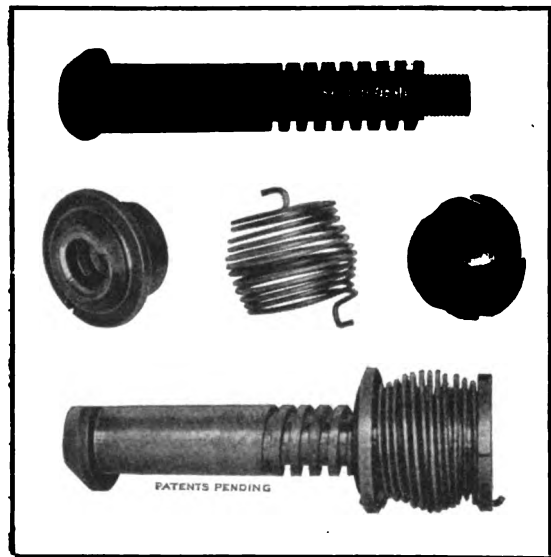
ing and operating his light switch—and it does away with the petulance which many drivers naturally feel in having to be constantly reaching for a dash switch.

V & S Self-Adjusting Bearing Bolts Take Up Wear As It Occurs.

A revolution in bearing manufacture and installation would seem to be in store for the automotive industry, provided the automatic bearing bolt manufactured and distributed by the V & S Automatic Bolt Co., of Chicago, continues to be received as well as it has been in the past few months.

The bolt, an innovation and a unique idea, automatically takes up wear in the connecting rod, or other bearings, as fast as it occurs, it is said, permits better lubrication, and reflects other economies to working parts of the engine.

It is provided with an "Acme" left-hand thread for the revolving nut and a right-hand "V" thread, on a smaller diameter at the end of the bolt, for the spring-lock nut.



Automatically Takes Up Wear in Bearings.

The revolving nut is provided with a chamfered face on the contact side toward the head or cap of the connecting rod and has sufficient tolerance to offer but slight resistance in taking up wear.

The spring which is attached to the revolving nut as the propelling force is of the barrel type, which permits the tension to be acquired from the center coils first and not from the end coils until maximum tension is required, thereby avoiding binding and breakage. The revolving nut cannot back up.

The spring-lock nut is provided with four adjustment slots, so that any desired spring tension may be obtained, and has a right-hand thread, which, with the spring tension pulling to the right, locks it on the bolt.

The installation is made by removing the engine under-pan, exposing the connecting-rod bearings, and removing all caps and bolts. The shims are removed, if used; if not, a space of 1/16-inch, at least, must be provided between the cap and the rod by filing that amount from the cap faces, in order to permit the bolt to function in its work of automatically adjusting and keeping in adjustment the bearing.

The bolt holes in the cap are then reamed 0.005 of an inch larger than the bolt to be used, following which the under-face of the logs of the cap are end-milled sufficiently to provide a space of 1/32-inch between the revolving nut and the spring-lock nut. This prevents interference and undue splash, and also provides a smooth surface for the revolving nut of the automatic bolt.

The preparations completed, the bolts are inserted in the rod, the caps placed in position, the revolving nuts attached by finger pressure only, and the spring-lock nut is then placed on the end thread and tightened against the shoulder of the bolt by the small spanner wrench provided.

The hook of the spring is then engaged in one of the four tightening or adjusting slots of the spring-lock nut by means of a small wire loop on the handle of the spanner wrench and is brought to proper tension, which is determined by the "feel." It is not necessary to burn or scrape in the bearing, provided it has any ordinary contact with the crank-pin.

The space previously occupied by the shim now admits more oil to reach the bearing surfaces and, if the bearings are properly chamfered on each side of the crank-pin, a valley is formed for the storage of oil, which in turn creates a steady cycle of lubrication.

The manufacturers show that the bolt will prevent loose and hammering connecting-rod bearings, thereby saving connecting-rod and main bearings, preventing side-play and piston-slapping, and stopping excessive wear on piston pins, bushings and rings.

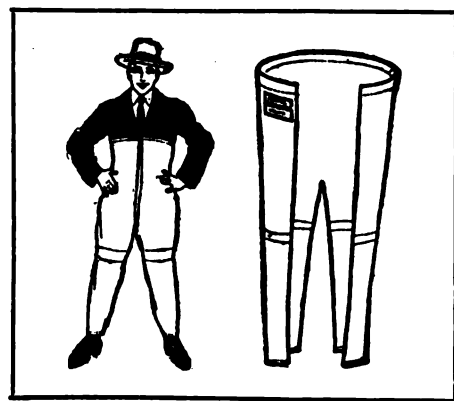
Their dealer's catalog shows 280 makes of cars, trucks and tractors, covering 1,068 models for which bolts can be supplied. In addition, they announce automatic bolts for airplane engines, motor boats, air compressors, and industrial purposes, and will soon start production on main and other types of bearing bolts.

Their distribution will be through dealers, garages, repairshops, jobbers and state distributors. A graduated advertising campaign is being planned to support the sale of the bolts, and will use space in local dailies, class, trade and technical publications and other mediums.

Car Drivers Appreciate Comfort and Economy of Jiffy Jumper.

Any man who drives a car will recognize the comfort, convenience and practicality of the Jiffy jumper.

The Jiffy jumper, it is said, will not



Jiffy Jumper is Cool, Comfortable and Protects Clothing.

wrinkle the clothes and can be put on or taken off in four seconds. There is no occasion for running dusty or muddy shoes through the Jiffy jumper. It is not an overall, but is put on and held firmly in place by flexible steel bands.

The Jiffy jumper is cool, comfortable and affords a real protection for the car driver's clothes during tire or engine trouble.

Jiffy jumpers are made of the best grade government olive drab ducking and can be readily laundered. They are made in one size only and will fit any size person.

Prices and further details will be gladly supplied upon request by the American Specialty Co., Dept. K-1, 706 Chestnut St., St. Louis, Mo.

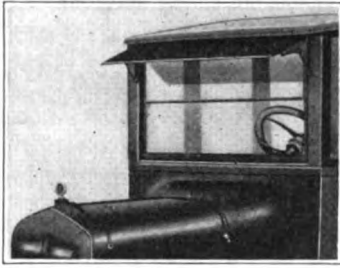
Loudon Adjustable Storm and Sun Visor Fits Any Car.

The Loudon visor is made to go onto any car. Because of the adjustable feature and the neatness of the fastening, it is said that this shade has become a big favorite for the high-priced cars and that some distributors are specifying this shade on all their cars.

Another interesting feature is the special bracket or arm for attaching the Lou-

don visor to the Ford touring car, which has no upright separate from the glass.

The visor is built over a reinforced steel frame, which prevents all sagging and flapping. It is covered with best quality Rub-



Reinforced Steel Frame Prevents Sagging and Flapping.

beroid top black, to match the top of the car, and green below to shade the eyes.

Write Loudon, Inc., Minneapolis, Minn., for complete details.

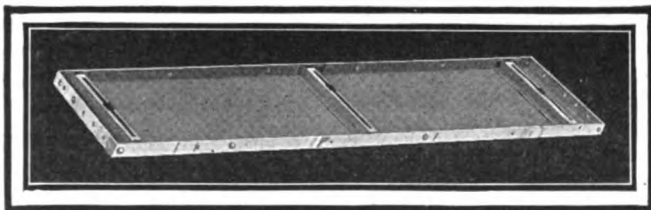
A New Indestructible Running-Board for Automobiles.

The running board of a machine, due to its exposed position, is subjected to particularly trying conditions throughout its life, moisture causing wood—the material used universally for this construction previous to the development of the steel type—to buckle, warp and shrink.

The warping of this board soon mars the appearance of a car and lowers its resale value. The buckling and shrinking loosens the bolts by which the board is attached to the fenders and body, causing rattling and an increased rate of depreciation, due to the resulting weakness of the entire structure.

The A. O. Smith Corp., of Milwaukee, Wis., the large, well-known pressed-steel products company, is putting out a new automobile accessory—a pressed steel running board—which is arousing considerable interest in automotive circles. The new board is of practically the same weight as its wooden predecessor, is absolutely rigid and has infinitely longer life.

A big asset of the steel board is its long



Pressed Steel Running Board is Rigid and Long-lived.

life. After collisions that would splinter and ruin wooden running boards, the steel type can be put into perfect condition with a lead hammer. Another advantage of the steel board is the ease with which it can be attached.

The shanks of the carriage bolts used for this work never held satisfactorily in wood, rendering a tight joint impossible. The steel boards are so formed that these

shanks are held firmly, but without binding.

The Smith steel board is furnished in two styles of covering—linoleum and aluminum. The linoleum is glued to the steel under great pressure, and is then edged and riveted, insuring permanency. The aluminum style is fully riveted, and makes a permanent and beautiful board for any car.

Dunn Accessories Prove to be Very Popular with Motorists.

Among the many accessories offered to motorists, few are as popular as Dunn counterbalances, Dunn support for Chevrolet 490, and Dunford fender braces, all made by the Dunn Mfg. Co., Clarinda, Iowa. These articles fill a definite need, and the large sales attained by each article show the satisfaction they give. It is said that jobbers and dealers report them as being among their most active sellers.

Dunn counterbalances are designed to eliminate one of the chief troubles of most motorists—vibration caused by an unbalanced crankshaft. Every garageman and dealer knows how this vibration decreases the efficiency and shortens the life of the motor. Expensive cars come equipped with balanced crankshafts—their motors run smoothly and powerfully at any speed. Less expensive makes can obtain the same results, it is claimed, by installing Dunn counterbalances.

Anyone can install them in a few minutes, as a wrench is the only tool needed. They lengthen the life of the motor, increase its power and speed, give greater mileage from gasoline, and add to its efficiency generally.

The Dunn motor support for the Chevrolet 490 is a semi-steel truss which attaches to the motor and frame directly in front of the flywheel and holds motor, clutch and transmission permanently in perfect alignment. It can easily be installed by anyone in a few minutes with a wrench, as it is not necessary to drill any holes. It is popular with Chevrolet owners.

Dunn front and rear braces are designed to overcome the breaking, cracking, twisting, rattling and other troubles common to the rear fenders on the Ford car. Their low price has made them a favorite with Ford owners. They have always proven satisfactory, it is said, and enjoy a large sale.

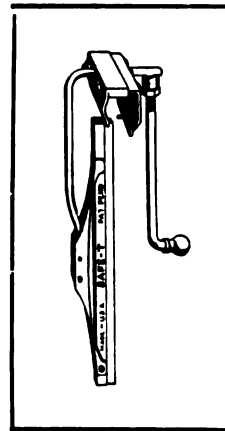
The Dunn Mfg. Co. is making an attractive proposition to jobbers and dealers on these products. Write the company for complete information. Address Dept. B., Clarinda, Iowa.

Dealers! Safe-T Windshield Wipers Will Help to Increase Sales.

With the coming of winter, with its snow and sleet, it becomes increasingly important

that the automobilist equip his car with suitable means for keeping the windshield clear and clean. Safety to himself and his automobile demand this precaution.

For this purpose, the Safe-T windshield wiper will be of particular interest. The Safe-T is simple of construction, durable



Safe-T Gives Even Wiping Effect.

and easy to operate. The pressure is so distributed to the upper and lower ends of the squeegee as to get an even wiping effect. The slanting angle at which the rubber presses against the glass is reversed at the beginning of each stroke, thus wiping the glass perfectly clean and dry.

The Safe-T is made in one style which fits both open and closed cars and is being offered at an exceptionally low figure.

Further details concerning it may be obtained upon request from the Stadeker Metal Specialty Co., 310 South Canal St., Chicago.

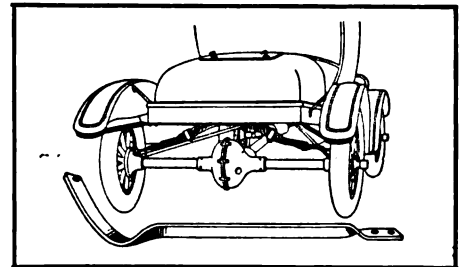
Lindquist Pedal Cuff a Protection Against Theft for the Ford.

The Lindquist pedal cuff is a strong, durable device, which is easily and quickly attached and will, it is claimed, last a lifetime.

A customer said of it: "Your Ford pedal cuff is the best thing I ever saw. I am delighted with it."

The operation of the Lindquist pedal cuff is extremely simple and it is said that it is impossible to operate a car after the cuff is attached.

On style No. 1, the cuff is clamped

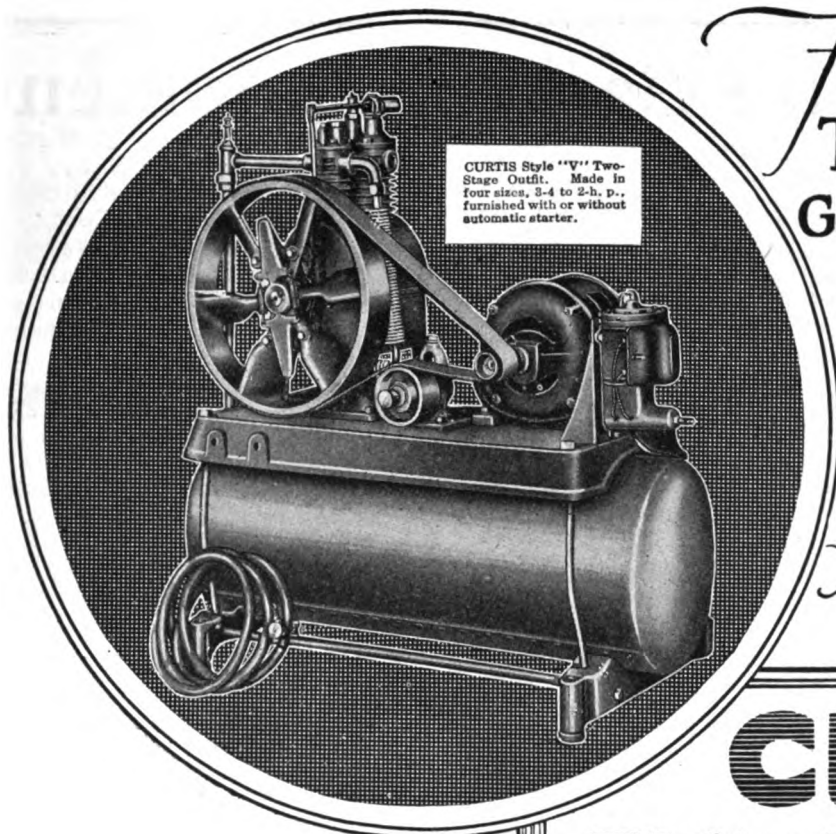


Dunn Motor Support for Chevrolet 490.

around the three pedals, the two open ends being secured with an ordinary padlock. On style No. 2, the hand lever is inserted into a slot in the long piece and the other part is then clamped around the pedals as in style No. 1.

Two brackets with screws are furnished for holding the cuff when it is not in use. These brackets are fastened to the floor board or any convenient place.

Further details will be supplied by the General Hardware Mfg. Co., 100 Marlborough St., Portland, Conn.



First and Only
TWO-STAGE
Garage Compressor-
With a
COPPER
INTERCOOLER
An Original Design

CURTIS

Why a Copper Intercooler?

BECAUSE the fullest advantage of two-stage compression lies in effectively cooling the air passing through the intercooler from the low to the high pressure cylinder.

BECAUSE, aside from gold and silver, copper throws off heat faster than any other metal—135% faster than cast iron.

CURTIS INTERCOOLERS

a—are made of COPPER tubing with COPPER radiating fins rigidly attached.

b—are 45 inches long, with nearly double the number of radiating fins found in competing machines.

c—are exposed their entire length to the cool blast of the fan flywheel.

COPPER intercoolers are found exclusively on CURTIS compressors.

"An Original Design"



THE efficiency of a two-stage compressor depends primarily on the efficiency of its intercooler, which varies according to the kind and thickness of the material used and its design.

Read just opposite, the "reasons why" for the Curtis Copper Intercooler.

Curtis Two-Stage Compressors are of the vertical type, providing a truly balanced design with a uniform load on the crankshaft. Machines of the horizontal opposed type have an opposed or reciprocating strain on the crankshaft. Thus the Curtis design assures less strain, vibration and wear—also longer life.

There is a definite good reason for every Curtis feature. Write for our new C-18 booklet. It will interest you.

Curtis Pneumatic Machinery Co.

1515 Kienlen Ave., St. Louis, Mo.

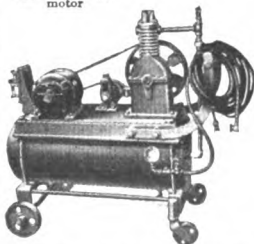
Branch Office: 530-U Hudson Terminal, New York City

Canadian Representative: Joseph St. Mars

706-B Sterling Bank Building, Winnipeg, Canada

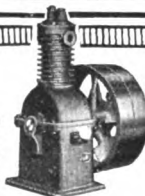


A. C. or D. C. motor



Curtis Single Stage Style "X" Outfit

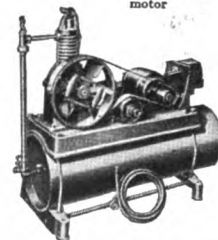
Unit at left comes in five sizes, $\frac{1}{4}$ to 3 horsepower. Furnished with or without automatic starting and stopping device, as ordered.



Curtis Single Stage Style "V" Outfit

Unit at right comes in five sizes, $\frac{1}{4}$ to 3 horsepower. Has automatic starting and stopping device with Curtis Centrifugal Unloader. Furnished with or without automatic starting and stopping device, as ordered.

A. C. or D. C. motor



The Original Model "B" Single Stage Line
 So Well Established and Favorably Known Everywhere

Curtis Outfits are the result of 67 years manufacturing experience, over 25 of which have been devoted to air compressors. As a result they embody certain original and exclusive features—assuring steady performance and economy of operation.

Up-to-the-Minute Garage Equipment

Watervliet Spiral Reamers Cut Smoothly and Will Not Chatter.

About a year ago, the Watervliet Tool Co., Inc., of Albany, N. Y., brought out its special line of Buick spiral reamers. At that time there were only eight reamers in the line, but these Buick spiral reamers



This Set Takes in 29 Bearings and Bushings.

proved so popular with repairmen, and so many requests were made for other reamers—particularly rocker-arm reamers and a reamer that would take in oversize piston pins as well as standard—that the company was prompted to extend the line to include these additional types.

Watervliet spiral reamers for Buick cars are now in use in most of the branches of the Buick Motor Co., as well as in hundreds of dealers' shops throughout the United States.

Another of the Watervliet reamers which has met with great favor among repairmen is the Watervliet spiral expansion aligning reamer which is especially designed for piston-pin bushings for all makes of cars and trucks, and which the manufacturer states is the best-selling tool the company has ever made. The spiral expansion aligning reamer cuts smoothly and will stay sharp, and reams for standard and all oversize pins.

Then there is the Watervliet spiral expansion aligning reamer for Ford piston-pin bushings—No. 3022½ PE. This reamer has been on the market only a few months, yet the company reports the receipt of



Seven Reamers in Strong Oak Case.

many orders. It is especially intended for piston-pin work, and was designed on account of the variation in size of Ford piston pins.

Particularly to be noted in these reamers, which offer a combined boring and reaming tool, is the self-cutting pilot which does the rough cutting and leaves the reamer proper to do the finish reaming only. The front pilot guides for the beginning and the rear pilot guides for the ending of the reaming. The holes must be reamed in perfect alignment for, it is said, you cannot do otherwise with this tool.

Left-hand, spiral flutes insure against chattering or "digging in." All Watervliet reamers cut easily and smoothly with a shearing motion, leaving a full bearing surface with a mirror-like finish.

The extreme simplicity of adjustment is another desirable feature. A slight turn of the screw in the end affords an even and accurate expansion and it is easy to micrometer.

Of the spiral reamers specially designed for Buick cars, there are: Buick king-bolt bushing reamers, which are made sufficiently long that both upper and lower bushings are reamed their entire length in one operation; Buick king-bolt bushing reamer with pilot with which, it is said, perfect alignment is positive as the pilot enters the lower bushing before the tool starts reaming the upper bushing; Buick solid piston-pin bushing reamer; Buick adjustable piston-pin bushing reamer with pilot, which, it is said, will perfectly align both sides of the piston for oversize pins; and the Buick rocker-arm reamer.

Watervliet spiral reamers for Ford automobiles include: Differential case bushing reamer; differential pinion bushing reamer; differential spider bushing reamer; D. S. housing front bushing reamer; hub camshaft bushing reamer; duplex spindle body and arm bushing reamer; duplex spindle body and arm bushing reamer with pilot; wrist-pin or piston-pin bushing reamer; wrist-pin or piston-pin bushing reamer with pilot; crankshaft aligning reamer; valve-stem bearing reamer; and push-rod reamers.

Tool steel, of the highest grade, has been used in the manufacture of Watervliet reamers, and all reamers are properly machined and specially heat-treated in electrically controlled gas furnaces, insuring a uniform, permanent, quick cutting edge.

"Our aim," says the Watervliet company, "is to make the best tools that present-day methods permit and, in doing so, we have not put our prices out of line."

Write the Watervliet Tool Co., Inc., Albany, N. Y., for circulars and prices, which will be furnished to anyone interested upon request.

Marathon O. K. Grinder and Buffer Is a Big Capacity Tool.

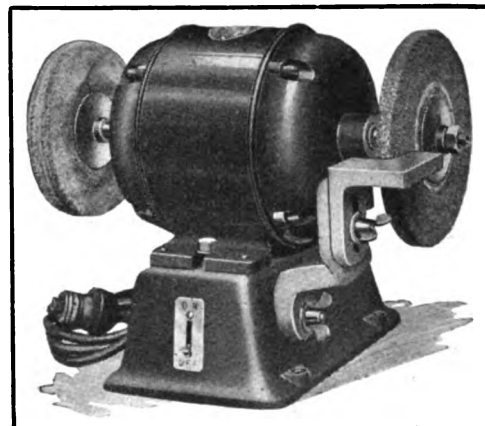
Now is the time for garages and service stations to make plans for greater and better business, during the quieter winter season, and certainly those plans must include the purchase of more and better shop equipment.

For that reason, you will want to know about the thoroughly efficient shop tool which is to be had in the Marathon O. K. grinder and buffer, that is being marketed by the Marathon Electric Mfg. Co., 24 Island St., Wausau, Wis.

Convenience, safety and long service are assured the fortunate possessor of a Marathon O. K. grinder and buffer—and all at an almost unbelievably low price for a tool of its size and capacity.

The "off-and-on" switch in the base is unusually positive and sturdy in construction.

Another feature which affords conven-



Offers Convenience, Safety and Service.

ience and safety as well, is the construction of the control lever which may easily be lifted into running position with the finger and shut off in an instant by a quick downward drive of the hand.

A totally enclosed motor—the Marathon O. K. ¼ h.p., alternating current, single phase, for 110 or 220-volt, 60-cycle service—is a safety feature which will be appreciated.

The motor, which is guaranteed for one year, is held together with four bolts through the end-bells, instead of using a multitude of screws. Less than half the usual number of parts are used in this motor, this simplification not only permitting the low price but serving also to minimize repair expense for the user.

A motor speed of 1740 r.p.m. permits the use of a 6-inch wheel and buffer, in place of the small wheels necessary with the usual 3400 r.p.m. motor. The better clearance offered by the large diameter wheel and buff is a decided advantage.

Make Your Store the Most Talked of in Your Town

The EN-AR-CO BOY and SLATE SIGN and Epigram Service Will Do It

Popularize your store—make people talk about it. Make them look for it and come out of their way, if necessary, to pass it. Turn this popularity into cash profit, and do it with absolutely no effort on your part.

The Big En-ar-co Boy and Slate sign will do this for you. It is doing it for thousands of dealers everywhere. It gets the attention of the passerby instantly—it holds their interest constantly—it creates talk—it **sells goods!**

Look at the reproductions on this page. Read the clever, witty, catchy sayings. Then think what this Big six foot En-ar-co Boy will mean when you stand it out in front of your place, with a new funny saying chalked on the Big Slate every other day.

How to Get This Sign

This En-ar-co Boy and Slate Sign and Epigram Service is the greatest trade builder ever offered. It will increase your sales of En-ar-co Motor Oil 100 to 300 per cent. This has been proven by the thousands of dealers who use it. You will admit yourself that such a sign is a great attention getter—a trade producer—a profit maker.

This very unusual sign is only available to dealers selling En-ar-co Motor Oil and other En-ar-co petroleum products.

It is **not** for sale.

It is **not** given away.

It **cannot** be rented.

But—if you handle En-ar-co Motor Oil, we will loan it to you for use in front of your store absolutely **FREE**, if you will agree to pay us 30 cents per week, or \$15 per year for the epigram service—that is, the witty, clever sayings which you chalk up on the Big Black Board every other day.

Stock and Sell En-ar-co Motor Oil and Other En-ar-co Petroleum Products

There is absolutely no other way by which you can secure this sign. It and every one of the epigrams are copyrighted. There is absolutely no other method by which you can secure so much increased profit as by the combination of this sign and the selling of En-ar-co—the highest quality Motor Oil on the market today.

Make your store the most progressive in your town—make it the most popular—make it the most looked for. Everybody likes the up-to-the-minute man and will patronize him in preference to all others.

Write today for full particulars. Learn all about the Big En-ar-co Boy and Slate Sign, the epigram service, and the other advertising helps we give our dealers. Be the first in your community to get started. Use the Coupon. Use it Now!

THE NATIONAL REFINING COMPANY

National Headquarters, J-731 National Bldg., Cleveland, Ohio
4 Modern Refineries : 93 Branches

THE NATIONAL REFINING COMPANY,
J-731 National Building, Cleveland, Ohio

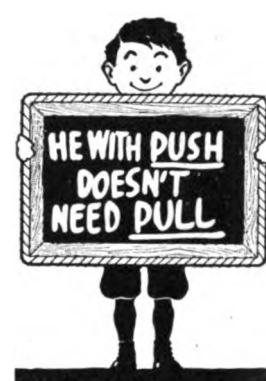
Without obligation to me please send full detailed information regarding the En-ar-co "Boy and Slate" and Epigram Service, and other advertising helps.

Name.....

Address.....

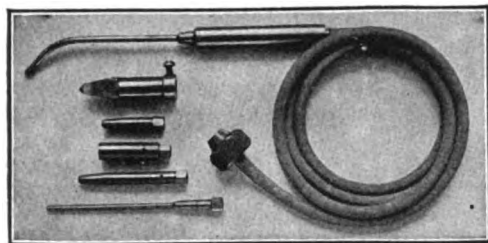
City..... State.....

I now sell..... Oil.



The grinder is a standard 6-inch by $\frac{1}{2}$ -inch, No. 60 Norton abrasive wheel. The buff is a standard 6-inch by $\frac{3}{8}$ -inch Hanson Van Winkle cotton buff, unsewed.

The Marathon O. K. grinder and buffer is an ideal machine for grinding tools, preparing metal surfaces for welding and for



Torit Acetylene Torch No. 13.

countless other uses in machine shops, garages, repairshops and wherever men work in metals.

It is not too large for the garage or basement work-bench of the home tinker, for use in keeping tools and cutlery sharp and silverware burnished.

In fact, the Marathon O. K. grinder and buffer is a big capacity tool which covers a wide range of uses.

Torit Torch Paves Way to Many Profitable Repair Jobs.

It was just three weeks before Christmas but there was no evidence of Christmas cheer in Ormsby's shop. Instead, an impenetrable gloom seemed to envelop the place.

Ormsby, himself, an elbow propped on his knee and chin resting in the palm of his hand, was gazing dejectedly through the repairshop window at the hurrying throng of Christmas shoppers. His helper, Lane, puttered aimlessly about the shop in which there was all too plentiful evidence of the slackness of the season.

Lane looked at his employer hesitatingly. Then said:

"I wish you felt that you could afford one of those new torches, Mr. Ormsby. I know of at least four jobs we could get if we had one."

"But, Lane," objected Ormsby, "we couldn't use it if we had it. We'd have to have gas for operating it."

"Oh no, we wouldn't," broke in Lane eagerly. "The Torit torch is operated by acetylene gas and we have that."

"That so?" questioned Ormsby with more interest. "Where'd you learn so much about this torch?"

"I saw it in a garage at Virden last week. It's made for using acetylene only and the tips are made so as to syphon or suck in air to help combustion.

"A set of four tips and soldering copper come with the torch, so that you can do different kinds of work. One thing that I noticed particularly was that there was a long tip for working down in radiators. That surely would have helped us with Richardson's radiator the other day, wouldn't it?"

"I'll say so," agreed Ormsby. "But how does the thing work?"

"Like a charm," answered Lane enthusiastically. "All you have to do is connect it to a Presto automobile tank, open the valve, light the gas, and adjust the flame so that a small flame of greenish color appears within the larger one which is of a yellowish color, similar to the regular welding flame.

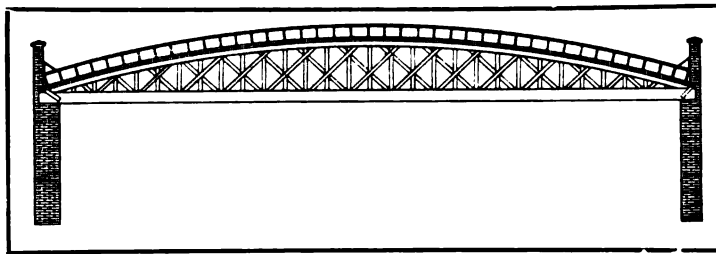
"To use the soldering copper, you put it on tip No. 4 and fasten it with the screw provided for that purpose. The flame within the torch keeps it hot all the time it is in use."

"The tank we have is a Searchlight," suggested Ormsby. "It wouldn't fit that."

"Yes, it would," said Lane. "You can get it with connections to fit either Presto or Searchlight tanks. I asked about that."

"Evidently," grinned his employer, "you've made up your mind, at any rate, on our need of the torch."

"You're all right, Lane," he added, as he



No Posts Needed With Double Lattice Truss.

saw the embarrassed flush creep over his helper's face. "I'm glad to see you keep your eyes open for things that will help us get a little business. We certainly need it. If I can't get in a few jobs between now and Christmas, I'm afraid those kids of mine are going to have slim stockings. How much does this outfit cost?"

He whistled surprisedly at the figure named.

"That all? Well, we surely can take a chance on it if that's all it costs. With any kind of luck, it should pay for itself in a mighty short time."

True to prediction, the torch did pay for itself very quickly and Ormsby and his helper soon found that there was a considerable amount of unsuspected business to be had in the way of repair jobs which they could easily handle now that they had the new torch. In fact, they found work enough coming in to keep them busy, and Ormsby's face, which had worn an anxious look, resumed its oldtime genial expression. There would be a merry Christmas for his little brood after all.

What the Torit soldering torch No. 13 did for Ormsby it can do for you. It will be found exceptionally convenient for doing numerous small jobs, such as soldering, brazing, sweating, heating, tempering, bending and radiator repairing. It is quick, cheap and dependable.

The "Doctor of Metals," as this wonder-

ful little torch is called, will be appreciated wherever a quick, hot flame is required.

Torit torches are not intended for lead burning.

The St. Paul Welding & Mfg. Co., 165 W. 3rd St., St. Paul, Minn., manufacturer of oxy-acetylene equipment, will gladly forward complete catalog and prices upon request.

No Snow Load Too Heavy for Double Lattice Truss.

If you are building a new garage or service station, or are planning to remodel the building which you now occupy, you will be interested in the new double lattice truss which is being sold by Leo McDaniel, Cairo, Ill.

This double lattice truss is a new and improved roof truss, which is built at the building in spans up to 125 feet wide and is said to be a marked improvement over the old type of trusses which have been used in years gone by.

Its use eliminates all posts, and it will carry any weight of snow up to 70 pounds per square foot.

A double lattice truss will add to the value and security of your garage building, and can be supplied for any style one-story building.

Write Leo McDaniel, 218 Ninth St., Cairo, Ill., for prices and complete information.

New Type "Wickey" Battery Ready for National Distribution.

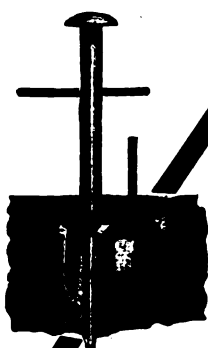
Arrangements for manufacturing and distributing on a national scale a new type storage battery, different in construction



"Wall" Separators Are Eliminated.

and performance from the wet acid batteries in common use, are being made by the Wickey Battery Co., 730 Exchange Ave., East Chicago, Ind.

While this battery has been manufactured



Reseating —refacing

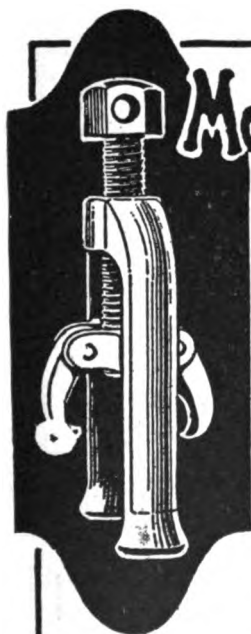
require accurate tools. Skinner cutters are ground to a true cone, cut with the pressure of two fingers, and stay sharp. Five sizes taking $1\frac{1}{8}$ " to $3\frac{1}{8}$ ", together with $5/16$ ", $3/8$ ", $7/16$ " and $1/2$ " pilots come with the

SKINNER MOTOR VALVE SET

—which also includes a refacer that will cut a true seating surface on a warped tungsten valve head—any size. Valves can be ground in, in 30 seconds, after using this set.

Net to garage
or dealer, \$22.50

M. B. SKINNER CO.
558-562 Washington Boul.
CHICAGO



More Power for the Buick

When the valves of the Buick become fouled with carbon they do not seat properly and there is a noticeable loss of compression and power. With clean valves the motor runs smoothly. Each cylinder receives and discharges regularly, giving that sharp, snappy exhaust which demonstrates that the motor is giving the maximum power.

The peculiar valve construction of the Buick makes it difficult to remove the valves for cleaning with ordinary tools. The best device made for this purpose is the

BUFFUM BUICK VALVE REMOVER

It is the only tool that will properly remove the Buick valve from assembly. It is quick, sure and safe, eliminating the danger of bending washers, valve stems and valve springs or breaking the valve cage. The breaking of any of these parts may lay up the car for days and weeks. Fits Buick motors of all sizes since 1912. Is strongly built of the best materials, yet is light and compact.

Every garage and repair shop should have one as regular equipment. Dealers find them ready sellers to Buick owners, who should carry them, especially in touring, as they may get broke down-out in the country where a garage might ruin valve cage.

Retail Price \$2.00. Fully Guaranteed.
Write for Trade Prices.

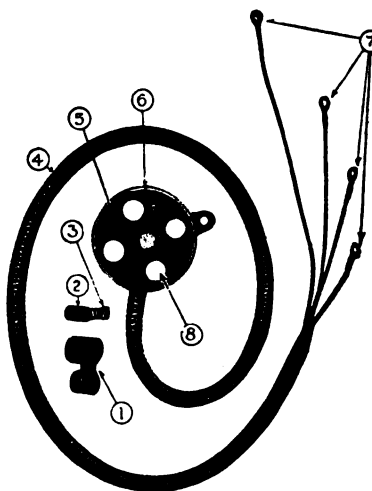
BUFFUM TOOL CO.

Factory and General Offices
4th and N. Carolina St. LOUISIANA, MO., U. S. A.



For
FORD
Cars,
Trucks
and
Tractors

TURNER (2 in 1) TIMER



A fast selling product that will give lasting satisfaction to every Ford owner. Made for Ford cars, trucks and tractors. Assures an easy start in any weather, lessens fouling of two front plugs, saves gasoline, stops "kicking", is oil, grease and water-proof. Requires no oiling and is easily installed.

1—Brush container is of cast steel and brass, and will last indefinitely. 2—Contact brush of specially treated phosphor bronze. 3—Contact spring is of high grade piano wire telescoping type. 4—Flexible metal conduit cord packed, which entirely houses all wires. 5—Genuine Bakelite insulated Timing Disc. 6—Timer shell of aluminum. 7—Note the four different lengths of wires, the only wires that you have to connect. 8—Hardened brass contacts of best quality are used. A machined product throughout. Timer and wire assembly complete\$4.50

TURNER SPRING LEAF SPREADER AND LUBRICATOR



—Greatly increases riding qualities of any car, stops squeaks and spring breakage and increases spring wear. Makes steering easier and saves tires. The only device made that spreads spring leaves and lubricates them in one operation without fuss or muss. The grease goes just where it is needed and nowhere else. For all cars. Price\$2.50

For convenience of car owners we furnish one pound cans of special spring lubricant for use with our lubricator. Price\$1.50

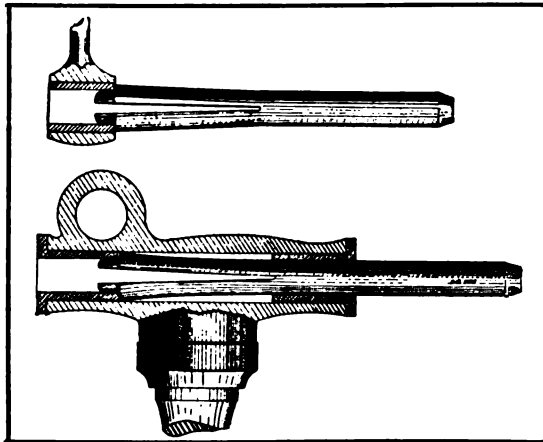
TURNER SAFETY LIGHTING WIRE ASSEMBLY—

Beautifies the car and protects it from the greatest source of automobile fire loss. All enclosed by flexible metal conduit. Water, grease and oil-proof. Eliminates short circuiting. No bare wires to cause road repairs from magneto shortage. Can be installed by anyone in ten minutes. For cars with starter, \$2. For cars without starter, \$1.50.

TURNER MANUFACTURING CO.
KOKOMO, INDIANA

for the past three years, operations have been purposely limited during this time to permit thorough testing of the battery, both in the Wickey plant and in actual use on the road. More than 3,000 batteries are in use today, the original Wickey battery being among them.

The principal arguments advanced for the new Wickey battery are: That this battery does not require regular care and attention; that it is practically trouble-proof;



Two Small Pilots on End Keep Rose Bushing Remover in Correct Alignment.

that it is non-freezable; that it operates efficiently without water for periods ranging from three months to six months, or even longer, depending upon the conditions of service. The battery is guaranteed for three years of service.

It is called a semi-dry battery. The acid and water electrolyte of the wet acid battery is displaced by a semi-solid mixture—the Wickey formula electrolyte compound. There are no separators such as are found in wet acid batteries. Instead, there are strip isolators which occupy but a fraction of the space ordinarily given to separators. These strip isolators are narrow strips of hard rubber. Three isolators, one at each end and one in the middle, are fixed permanently between each plate.

Practically all the space between the battery plates is occupied by the Wickey electrolyte compound. Since this compound is semi-solid, the battery plates are always entirely covered, the compound acting as a protector and "feeder" for the plates. The compound does not evaporate and the evaporation of water which is added at long intervals is hardly noticeable. This compound is non-corrosive.

With nothing to retard the circulation of current, the compound forms a free and unrestricted path for the free and constant flow of electricity within the battery cell. To this free circulation, and because of the elimination of "wall" separators, is attributed much of the remarkable performance of the Wickey battery.

In explaining the merits of the battery, it is pointed out that proper circulation is as vitally important to the battery as it is to the health of a human being. Free and unrestricted circulation within the Wickey

battery means that an even temperature is maintained. It means that overheating or freezing is prevented. It follows that, with proper circulation, the highest possible degree of efficiency results, and breakdowns and consequent repairs are the exception rather than the rule.

Many severe and unusual tests have been put to the Wickey battery. It has been found that the battery will function perfectly while frozen in a cake of solid ice, or while totally immersed in a tub of water. Other tests have shown that the plates will not buckle. A short circuit, even when strong enough to melt nails or iron bars, will not injure the battery.

Having thus tested it and tried it for three years, the Wickey company is now arranging dealer territories and planning to put the battery on the map in a national way just as soon as arrangements can be completed.

New Rose Bushing Remover Is of Novel Design.

The Frank Rose Mfg. Co., of Hastings, Neb., is continually adding to its already large line of automotive necessities. Just now the company is placing on the market a bushing remover of novel design.

It consists of a steel drift split to give it tension. On the end are two small pilots serving to keep the remover in correct alignment on the bushing when the remover is used for drifting bushings where the casting itself does not serve as a guide.

The remover is particularly desirable for removing spindle bushings, tie-rod bushings, and spring-perch bushings, etc. At present it is made in two sizes—one for the Ford, and one for the Dodge—each of which will fit many other makes and models of cars.

Sterling No. 600 Cell Tester a Reliable "Trouble Shooter."

Do you want your battery service to be absolutely "top-notch," for speed, durability and accuracy, Mr. Service Station Owner? Then you will want to know more about the Sterling No. 600 high rate cell tester.

This instrument is the result of the utilization of years of experience and research in the manufacture of electrical equipment, says the manufacturer. It is very valuable to the service station for locating the

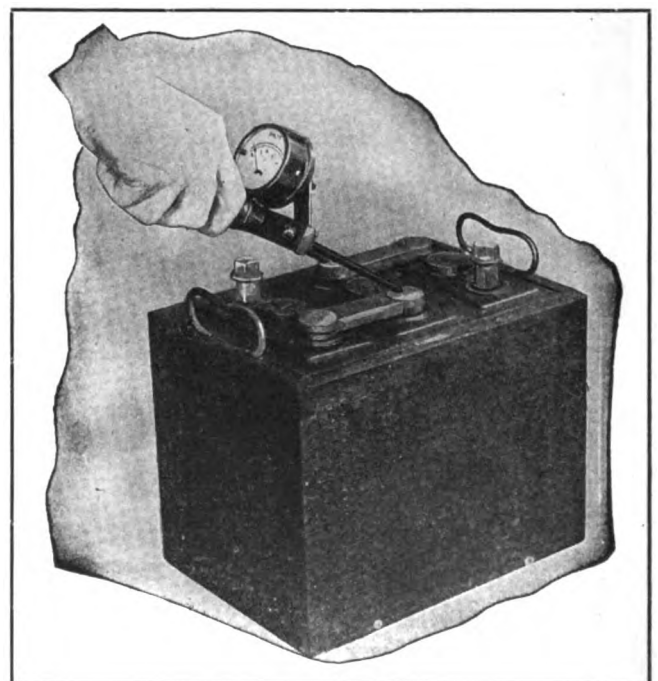
various troubles which affect the life and service of the storage battery and it is claimed that it will instantly indicate the presence of trouble in the storage battery by the mere application of the rigid terminals to the poles of the cells.

In principle, the high rate discharge test consists in taking voltage readings, while either the entire battery or the individual cells are being discharged momentarily through a circuit containing a fixed low resistance. This discharge practically duplicates the work done by the battery when used for starting. The voltage readings taken while the cell is thus discharging, therefore, indicate the cell's ability or inability to perform its functions properly under severe service conditions.

In the Sterling tester, the cell by cell method of performing the test has been adopted, permitting the assembling of all the necessary testing apparatus into the one compact unit. This method, it is said, was recently approved as a standard service station test by the electrical division of the Ohio Automobile Trade Association.

The mechanical construction of this instrument is simplicity itself. All the necessary parts, terminals, resistance, and voltmeter are combined into a single sturdy unit. The sharpened terminals are just three inches apart so that they register with the terminals of the cell. The voltmeter which is said to be an exceptionally accurate instrument has a capacity of two volts graduated into tenths of a volt. The scale reads both ways from zero, which is in the center, and thus permits an accurate reading regardless of the direction of the current.

Holding the handle of the device in one hand and applying the terminals to the poles of the cell allows a high discharge



Cell by Cell Method of Testing Adopted in Sterling Tester.

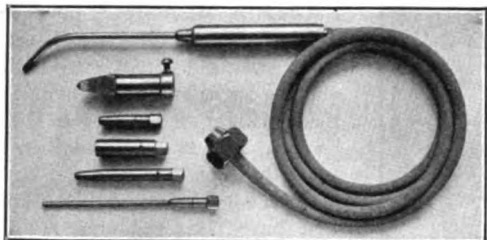
THIS HANDY TORCH

for the garage and repair shop will earn money for you.

Torit Acetylene Torch No. 13

operates with acetylene ONLY. Tips are so designed that they syphon or suck in air to assist combustion. It has no equal for soldering, light brazing, heating, tempering and especially for

RADIATOR WORK



Torit Acetylene Torch No. 13

is furnished with 4 tips for different kinds of work, 1 soldering copper, tubing and connection for auto acetylene tank.

PRICE..... \$7.50

It Gives You a Splendid Opportunity to Put One of Your Old Acetylene Tanks to Good Use

One of the features of this HANDY LITTLE OUTFIT is the long tip for working down into radiators. Another is the soldering copper. SHOULD be in every garage and repair shop.

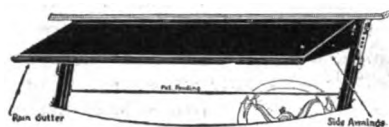
ORDER ONE TODAY

from your jobber or send direct to the manufacturer.

ST. PAUL WELDING & MFG. CO.

165 W. 3rd St.

ST. PAUL, MINN.



Popular Demand Makes New Era Visors Easy to Sell

There's no doubt about present and 1922 leadership of the New Era DE LUXE VISOR. It is much in advance. Of all metal, with patented rain gutter and side awnings, green underside, and adjustability to height of driver's eyes, it has improved features that owners welcome. Better rain shedder, greater protection from glares, more restful to eyes. At \$7.50 for the steel and \$10 for the aluminum, sales are quickly made.

Write today for catalog

New Era Spring & Specialty Co.

56 Cottage Grove Ave. Grand Rapids, Mich.

Manufacturers also of New Era Springs and New Era "Better" Bumpers

NEW ERA
DeLuxe VISOR
all metal

Keep Busy during the Winter Months

by turning out the kind of repair work that reflects credit on your shop.

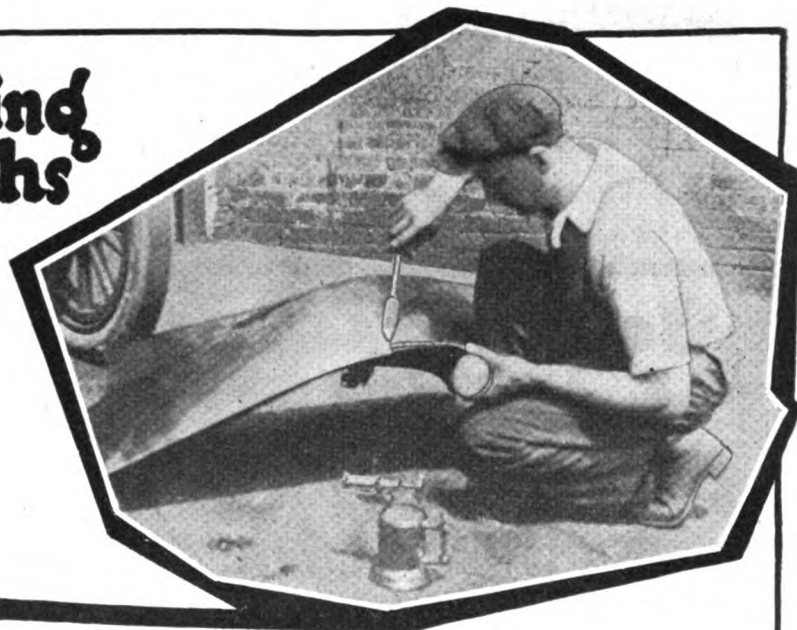
When painting fenders the cracks must be soldered properly if the job is to look right. For a neat, lasting joint use Kester Acid-Core Wire Solder. And you don't have to apply a separate acid—the solder supplies its own acid.

Result—a better job in half the time.

Send in the coupon for PROOF.

CHICAGO SOLDER CO.

4210 Wrightwood Ave. Chicago, Ill.



COUPON

CHICAGO SOLDER CO.

4210 Wrightwood Ave., Chicago

Am. Garage 12-21

Gentlemen: Please send me a free sample of Kester Acid-Core Wire Solder.

Name

Company

Address

City..... State.....

Our Supply House Is.....



Write the Sterling Mfg. Co., 2849 Prospect Ave., Cleveland, Ohio, for complete details.

Micrometer Accuracy Assured 3-A Micro Spark-Plug Users.

There was a time when the well-worn dime or the pen-knife was the only means the motorist had of adjusting his spark gap. This was, at best, a very primitive method and was inaccurate.

The 3-A Micro spark-plug makes knife-adjustment unnecessary. A set of copper shim gaskets, located between the bushings and the shell, allows the motorist to adjust the spark-gap of the plug to within 0.005 of an inch, it is said. In addition to this feature, the plug has met and conquered the meanest oil-burning, plug-consuming motors that have been produced and, after four years of service, has won the praise of thousands of discriminating users.

The Essential Automotive Products Co., 505 West 42nd street, New York City, takes great pride in having produced a spark-plug of rolled mica sheet which it claims is the most perfect heat-resisting electrical insulator ever produced. Due to the construction of the plug, the firing action prevents the formation of carbon at the terminals.

The word "Micro" means that the spark gap can be adjusted with micrometric accuracy and the slogan of the company is "This plug makes good or we do."

Paragraphs.

MUTUAL TRUCK Co.'s plant and equipment at Sullivan, Ind., will be offered at public sale by the receiver December 22. The sale will include 12 acres of land with siding to the C. & E. I. and Illinois Central railroads; a large, modern brick building with steel truss roof; heating plant, machine tools, drawings, blueprints, and a miscellaneous stock of materials and parts for building a 2½-ton motor truck. The First National Bank, Sullivan, Ind., is the receiver and E. D. Maple is the trust official in charge.

ALEMITE PRODUCTS Co., LTD., Belleville, Ont., will shortly begin the manufacture of Alemite products for the Canadian trade. The Alemite Products Co., Ltd., is a subsidiary of the Bassick Mfg. Co., Chicago, which successfully pioneered the Alemite system of lubrication. Decision to establish the Canadian subsidiary was forced by the strong demand in the Dominion for Alemite and other Bassick products.

The Belleville organization will start the manufacture of the Alemite lubrication system, the Gas-Co-Lator and perhaps one or two other products at once. Within a short time, every item of the Bassick line will be manufactured in Canada for the Canadian trade.

W. E. Rowsome is general manager of the Belleville plant. He states that production will be under way this month.

Use COUPON BOOKS

They Encourage Sales-- Place Your Business on a Cash Basis

The Southern Coupon System also simplifies your bookkeeping and eliminates petty charges—it is, in fact, an automatic accounting system without red tape, waste of time or losses through carelessness or dishonesty.

In place of a multitude of petty transactions involving endless bookkeeping is substituted a simple, self-regulating system, so easy to grasp that the most ignorant patron cannot complain nor

the most careless employe make mistakes. A coupon book has no value until issued, countersigned and dated. If lost or stolen it has no value.

The Southern Coupon System appeals strongly to motorists everywhere. They appreciate the convenience and protection it affords them. It has proved a stimulus to business wherever used.

Write at once for Illustrated Folder, Samples and Prices

Southern Coupon Co.

Box 1472 Birmingham, Ala.

to flow through the resistance element at the same moment the voltmeter registers the voltage. The purpose of this test is to reproduce the more severe conditions to which a battery may be subjected in service and, through the voltmeter readings, to obtain a comparison between the various cells of the battery as to their performance under such conditions. With the Sterling cell tester, you are enabled to place cells of the battery under test one at a time and obtain the voltage reading of the cells as they discharge.

It will be readily seen that the Sterling cell tester is a really efficient "trouble shooter," and well adapted to service sta-

tion work. By being portable and by employing the principles of a test which does not take into account the state of charge or discharge of a battery, its use enables the service station man to take the instrument to the battery and report the presence of trouble to an owner within a few moments after the battery is submitted for inspection.

Presenting a rapid, accurate method of performing a most valuable service test and being offered at a very reasonable price, the Sterling high rate cell tester is sure to prove a valuable and efficient addition to any service station or repairshop equipment.



*A line that
will pay
you to sell*

SUPERBESTOS Folded and Stitched BRAKE LINING

outclasses woven linings in both service and length of wear. Provides an effective braking surface when new and affords 100% efficiency from the time installed until it is worn out. Made from the best quality asbestos cloth. Vulcanized under a steam pressure of 1800 to 2000 lbs. per square inch, a lining of absolutely uniform thickness and wearing surface is produced. Has a brass wire insert which possesses greater wearing and heat resisting qualities than copper.

DEALERS and REPAIRMEN—
Write for data and prices on brake
lining, clutch facings, Ford Trans-
mission lining, running board mats
and packings.

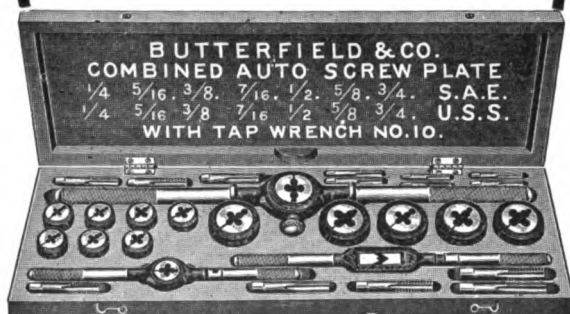
Manufactured by
MIKESSELL BROTHERS COMPANY
156 No. La Salle St., Chicago, Illinois
Plant and Works, Wabash, Indiana



BUTTERFIELD

Combination Automobile Screw Plates

serve best on automotive work because
they were designed expressly for garages
and repair shops.



Set shown in illustration enjoys a well deserved
popularity in the automotive field.

Contains in one set—both U. S. Standard and
S. A. E. Standard taps and dies—thus saving the
expense of buying a separate outfit of each.

Every tool guaranteed to cut rapidly and to pro-
duce absolutely accurate threads.

Write for Catalog No. 18.

BUTTERFIELD & CO. DIV.

Union Twist Drill Co.

62 Reade Street

NEW YORK, N. Y.

11 South Clinton St., Chicago, Ill.

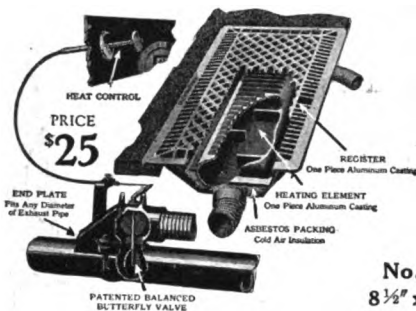
Capitalize Cold Weather

BY SELLING

CHANSON Car Heaters

A WINTER MOTORING NECESSITY
THAT YOU DON'T HAVE TO "PUSH"—

Winter Drivers All Want the Chanson

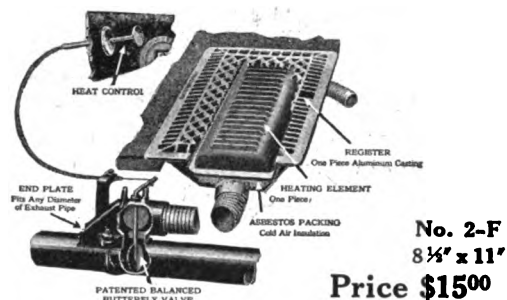


CHANSON CAR HEATERS, in both flush
and footrail types, are the most satisfactory
and efficient car warmers you ever handled.
Car owners appreciate their points of supe-
riority instantly. More motorists are driving
every Winter and cold weather makes them
buy heaters. Get your profits from this
business.

**One size Valve fits
all size exhaust pipes**

The Chanson Patented Balanced Butterfly Valve—
found in both types—controls the volume of heat at
all times. It is furnished with two sets of end plates
that fit ALL SIZES of exhaust pipes. These heat-
ers are quickly installed on ANY MAKE of car.

Heating starts when motor starts running. As-
bestos packing protects heating unit from cold air.
Trap in register makes cleaning floor of car easy.



More Winter Tops are coming into use every year.
Drivers of such cars immediately want a heater.
The Chanson—inexpensive, efficient, easily installed
—meets the demand as no other make can. Even
without a top, the Chanson furnishes enough heat
to make winter driving comfortable.

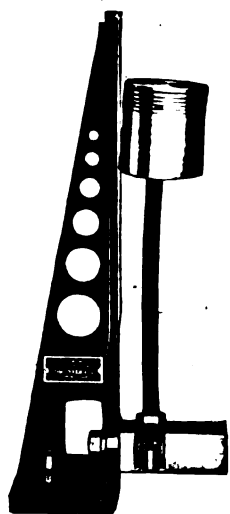
The Channon-Hughson Co. furnishes many helps to
dealers. Write today for complete sales particu-
lars. Every day your delay means profits lost.

CHANNON-HUGHSON CO.

227 West Erie Street

CHICAGO

ILLINOIS



Bent or Twisted Connecting Rods

*Straightened
with the*

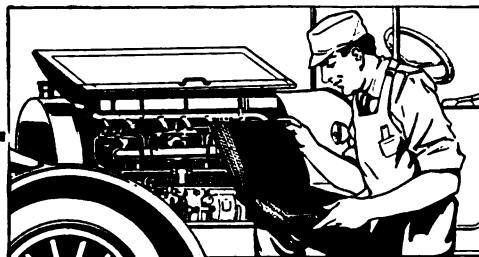
FORT HILL Aligning Gauge

Operates with
one arbor for
all types and
sizes.



75 percent of all troubles
with motors that have
been reground and re-
assembled is due to bent
or twisted connecting
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THE DYER COMPANY
Makers of Garage Equipment
155 Brookline St.
Cambridge, - Mass.



Make Your Shop "Electrical Repair Headquarters"

by handling this class of work in the time-saving, cost-cutting, error-proof way—like the man in the picture above. Before he touches a tool he sees a clear, accurate blue print of the car's whole electric system and knows how to tackle the job.

The AUTOMOTIVE WIRING MANUAL

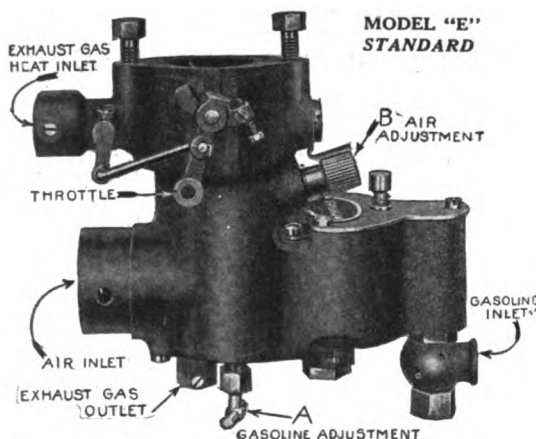
enables you to quickly and accurately repair the wiring or other electric equipment of all cars, including orphans and obsolete models. You can give your customers the kind of service for which they will not only pay handsomely, but also send their friends to you.

The Automotive Wiring Manual contains a wiring diagram of every model of every make of car since 1912. Over 800 blueprints altogether; everyone clear, sharp, and absolutely accurate in every detail. More than 600 of them are car and truck diagrams; more than 200 are interiors of generators, etc.

The profits on a very few jobs pay for this book. Price, delivered, only \$15.00. Send us your order and check today.

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Suite 924, No. 15 Tremont St., BOSTON, MASS.
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MARVEL CARBURETERS

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Universal Satisfaction

POWERFUL—

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Write for our new Catalogue

MARVEL CARBURETER CO.
FLINT, MICHIGAN, U. S. A.

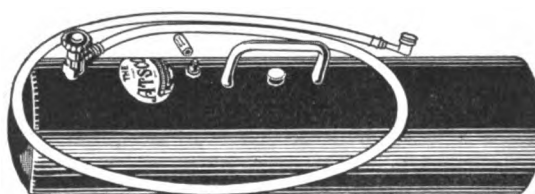
DEPENDABLE

The GARDNER is an air compressor that has over 60 years of reputation behind it. For complete information see our full page ads or send for illustrated circular in colors.

C. A. DICKERSON

614 Fisher Bldg.

Chicago, Illinois



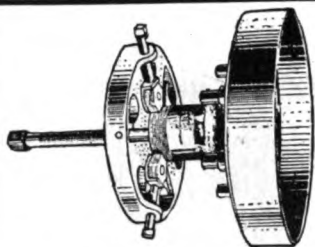
You Save Time With the ATSCO

The great time and back saver for filling tires. Once use an ATSCO Portable Air Tank in your emergency car or around the garage and you will never be without it. Some large garages have over a dozen. Tightest, safest tank constructed. Convenient to handle. Complete as shown ready for use. Price \$30.00, direct or through your jobber. Literature on request.

Air-Tight Steel Tank Company

Pittsburgh, Pa.

The F. & W. Universal Wheel and Gear Puller is the only tool made which can be fastened to the hub threads of any automobile.

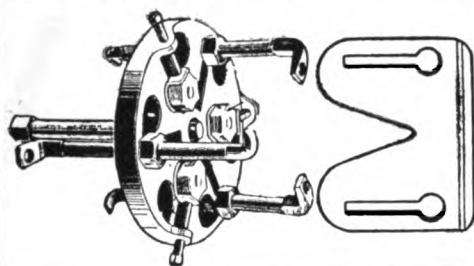


Strength and wide range of adjustment make this tool superior for gear pulling and arbor press work. Malleable plate for press shown at right of complete tool below. Note material used; heat treated nickel steel arms; hexagon blocks and large power screw are hardened malleable castings.

Each of the six sides of hexagon blocks shown above has different size thread for engaging any hub thread. Adjustable to hubs of various diameters. Any mechanic knows the advantage of pulling direct on hub instead of the old awkward method of hitching to spokes.

List price complete, \$32.00
Write for discounts.

LEWIS & MILLIGAN, INC.
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1110 Michigan Ave., Chicago, Illinois



CONTINENTAL "The Efficiency Standard" SHOP EQUIPMENT

The Continental Line

Motor Stand
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Battery Stand
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Spindle Arm
Bushings Press
Crank and Camshaft
Straightening Press
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Gear Pullers
Universal Straightening Press
Ford Assembly Table
Portable Work Bench
Propeller Stands



Portable Work Bench

This labor saving device—kitchen cabinet for tools and parts—is necessary in every repair shop. Built strong and sturdy. All compartments well arranged for tools and engine parts. Shipped knocked down. Crated flat.

Write for catalogue of complete line.

*The Best Garages use
Continental Equipment*



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Use F. A. A. MENDS in repairing scored
Cylinders, Cracked Water Jackets and
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with scientific welding.

When you are troubled with a Scored
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It achieves more and costs less than any other.
Give these MENDS a trial or ship your
CYLINDERS or CRANK CASES direct to
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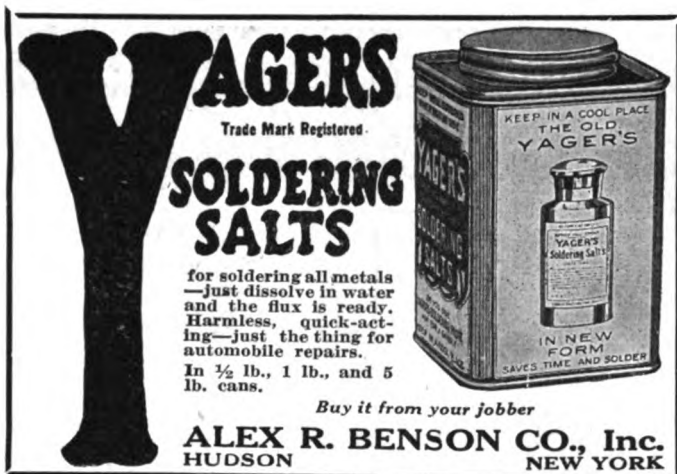
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NO WARPING or CRACKING.

Let us send full particulars—Write today.

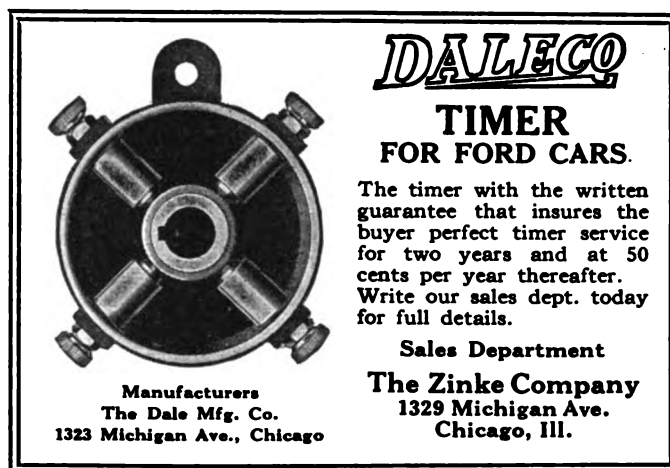
F. A. ALBERTUS & CO.

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Milwaukee, Wis.



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Trade Mark Registered.
SOLDERING SALTS
for soldering all metals—just dissolve in water and the flux is ready. Harmless, quick-acting—just the thing for automobile repairs. In $\frac{1}{2}$ lb., 1 lb., and 5 lb. cans.
Buy it from your jobber
ALEX R. BENSON CO., Inc.
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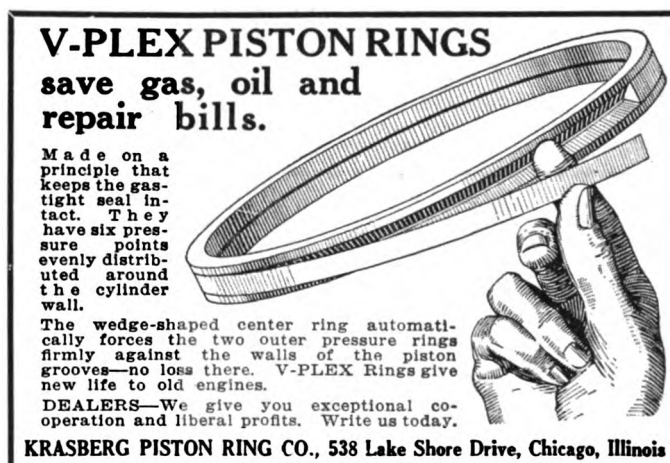


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TIMER
FOR FORD CARS.
The timer with the written guarantee that insures the buyer perfect timer service for two years and at 50 cents per year thereafter. Write our sales dept. today for full details.
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The Zinke Company
1329 Michigan Ave.
Chicago, Ill.

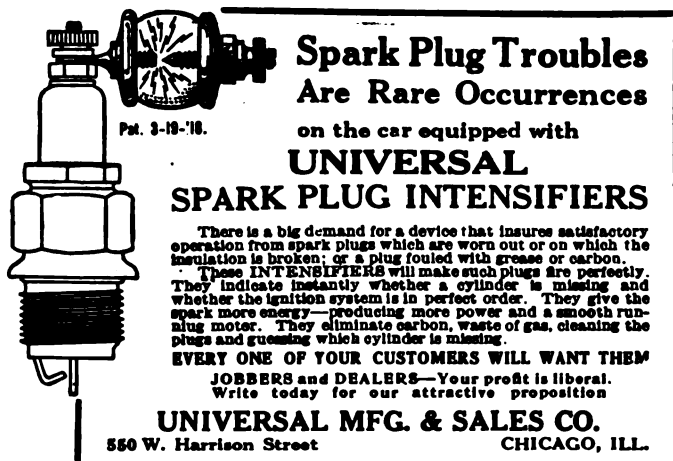
Manufacturers
The Dale Mfg. Co.
1323 Michigan Ave., Chicago



The Boe Double Action Grease Pump
Operates by forced air pressure or by hand or by a combination of both.
Accurate as a scale. Adjustable "visible" measuring. Indicator "B" travels nearly 8 inches for 1 lb. or pt. Can be set to dispense any exact quantity desired.
Will handle 30 pounds of silent gear grease in one minute.
Ask about our 15 other pump outfits. Biggest line of its kind.
BOE MANUFACTURING CO.
MINNEAPOLIS, MINN.



V-PLEX PISTON RINGS
save gas, oil and repair bills.
Made on a principle that keeps the gas-tight seal intact. They have six pressure points evenly distributed around the cylinder wall.
The wedge-shaped center ring automatically forces the two outer pressure rings firmly against the walls of the piston grooves—no loss there. V-PLEX Rings give new life to old engines.
DEALERS—We give you exceptional co-operation and liberal profits. Write us today.
KRASBERG PISTON RING CO., 538 Lake Shore Drive, Chicago, Illinois



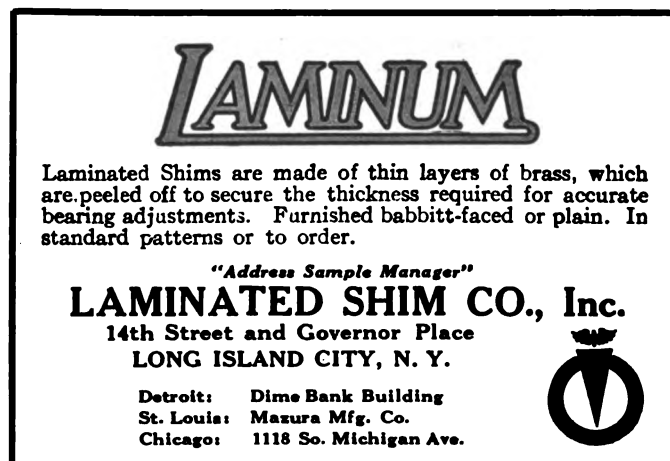
Spark Plug Troubles Are Rare Occurrences on the car equipped with UNIVERSAL SPARK PLUG INTENSIFIERS
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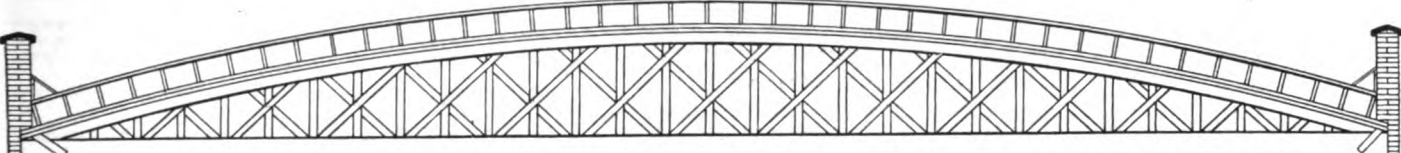
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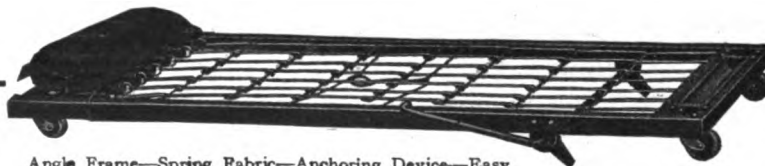
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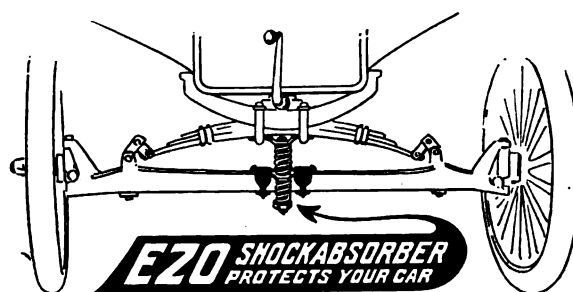
Continental Auto Parts Co., Columbus, Ind.

Index to Advertisements

A		J	
Air-Tight Steel Tank Co.	54	Jaffe Radiator Co.	—
Albertus & Co., F. A.	55	Jenkins Vulcan Springs Co.	—
American Bolt & Screw Case Co.	—	Jewell Polar Co.	—
American Specialty Co.	61	K	
Am-pe-co Sales Co.	59	Kennedy Car Liner & Bag Co.	61
Atlas Auto Supply Co.	—	Krasberg Piston Ring Co.	56, 59
Auto Specialties Mfg. Co.	—	L	
Automotive Publ. Co.	54	Laminated Shim Co.	56
B		Leich Electric Co.	4
Bailey Co., Geo. D.	—	Lewis & Milligan.	55
Benson Co., Alex. R.	56	Loudon, Inc.	—
Boddy, J. Newton	55	M	
Boe Mfg. Co.	56	McDaniel Contracting and Engineering Co., Leo.	57
Boissonnault Co., Inc., G.	58	Magnet Light Co., The.	—
Bowes Co., Robt. M.	57	Marathon Electric Mfg. Co.	7
Brewer Specialty Corp.	—	Marvel Carburetor Co.	54
Brunner Mfg. Co.	62	Marvel Machinery Co.	—
Buffum Tool Co.	49	Metals Repair & Supply Co.	57
Burd High Compression Ring Co.	57	Metal Stamping Co.	3
Burgess-Norton Mfg. Co.	—	Mikesell Bros. Co.	53
Butler Mfg. Co.	58	N	
Butterfield & Co.	53	National Cash Register Co.	—
C		National Refining Co.	47
Catelain, Andre G.	53	New Era Spring & Specialty Co.	51
Champion Pneumatic Machinery Co.	6	O	
Channon-Hughson Co.	53	Oakes, L. E., Sign Co.	—
Chicago Solder Co.	51	P	
Clarke Co., W. L.	—	Paro, H. G., Co.	59
Continental Auto Parts Co.	55	Premier Electric Co.	57
Curtis Pneumatic Machinery Co.	45	R	
D		Reynolds Spring Co.	—
Dale Manufacturing Co.	56	Romort Mfg. Co.	59
Dearborn Equipment & Hinchley-Meyers Co.	—	Rose Mfg. Co., Frank.	56
De Mund Sales & Service Co.	—	R. T. Mfg. & Sales Co.	—
Dickerson, C. A.	54	S	
Drake & Co., Frederick J.	—	St. Paul Welding & Mfg. Co.	51
Dunton Co., The M. W.	5	Sampson Electric Co.	59
Dyer Co., The.	54	Sawyer-Weber Tool Mfg. Co.	—
E		Schrader's Son, Inc., A.	—
Eclipse Valve Grinder Co.	—	Shaler Co., C. A.	—
Essential Automatic Products Co.	—	Skinner Co., M. B.	49
Ever-Tyte Piston Ring Div.	—	Southern Coupon Co.	52
Inside Back Cover	—	Standard Accessories Corp.	57
Ezo Shock Absorber Co.	61	States Chemical Co.	—
F		Sterling Mfg. Co.	5
Farmers' National Life Insurance Co.	58	Storm Mfg. Co.	56
Federal Electric Co.	—	T	
Flexlume Sign Co.	7	Taylor, H. D.	—
Foster Bros. Mfg. Co.	59	Trindl Co., The.	58
G		Tungsten Mfg. Co.	—
Ganschow Co., William.	—	Turner Mfg. Co.	49
Garden City Spring Works.	59	U	
General Accessories Corp.	—	U. S. Air Compressor Co.	—
Globe Mfg. Co.	—	Universal Mfg. & Sales Co.	56
Green Engineering Co.	—	V	
Greenfield Tap & Die Corp.	—	Van Trump-Eselbey Co.	—
Greer College of Motoring.	58	W	
H		Wagner Specialty Co.	—
Herald Printing & Publishing Co.	—	Warshawsky & Co.	58
Hicken Sod-Tor-Lite Co., B. E.	59	Washburn Burner Corp.	—
Hood-Dent Co.	—	Webber Co., F. H.	6
Hus Kee Tool Mfg. Co.	58	W. H. S. Mfg. Co.	—
I		Wickey Battery Co.	8
Indiana Parts Co.	—	Z	
		Zelnicker Supply Co., Walter A.	—
		Inside Back Cover	—
		Zinke Co.	56, 59

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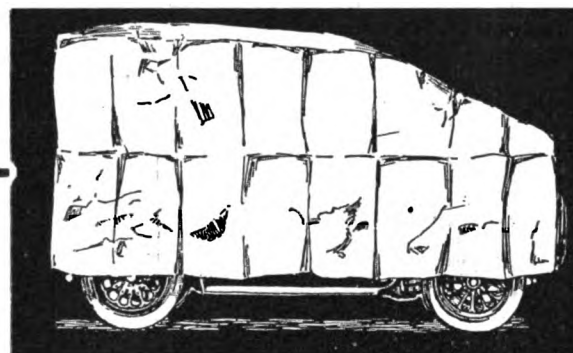
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are the recognized standard for storage purposes. Made of strong, heavy paper, properly reinforced—in sizes to fit all cars.

Car owners appreciate the value of Kennedy Auto Covers and you make a good profit on each one used. They also serve as a drawing card for your storage business and the repairs that go with it.

Write today for details and prices.

THE KENNEDY CAR LINER AND BAG CO.

Shelbyville, Indiana

Canadian Factory at Woodstock, Ont.

The JIFFY JUMPER

is needed by every car owner and driver



It effectively protects clothes during tire and engine trouble. Will not wrinkle the clothes—does not have to be pulled over shoes. Made of the best Government Olive Drab Ducking—can be laundered.

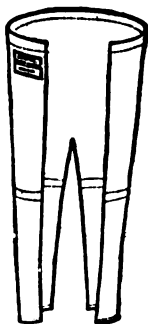
Slips on and off in four seconds. Made in one size and will fit any size man. Retail Price, \$2.00. Mail orders filled.

Jobbers, Dealers and Salesmen, write for Proposition.

THE AMERICAN SPECIALTY CO.

Dept. "K-1"

706 Chestnut St. St. Louis, Mo.




BRUNNER

SINGLE STAGE IS RIGHT

If a two stage garage compressor were right, Brunner could and would build the best one. Two stage construction is not secret—its principle is not patented. Brunner single stage models cost less to buy, less to operate, less to maintain and run longer. The Brunner Handbook—yours for the asking—tells the story.

What honest reason is there for
two stage compressors?

Brunner Manufacturing Company

Works: UTICA, N. Y.

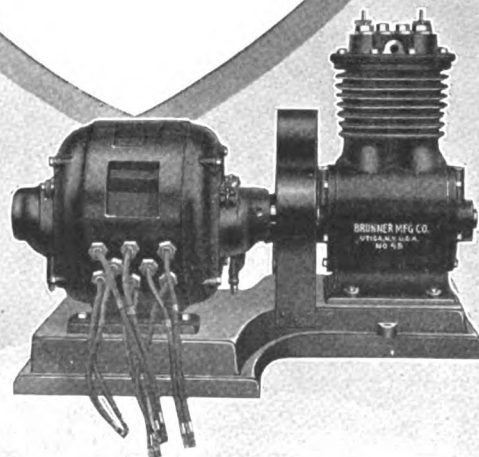
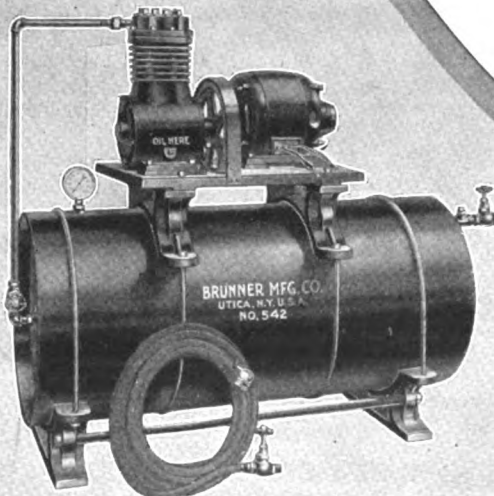
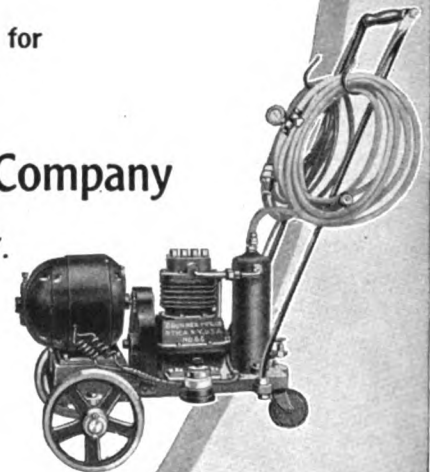
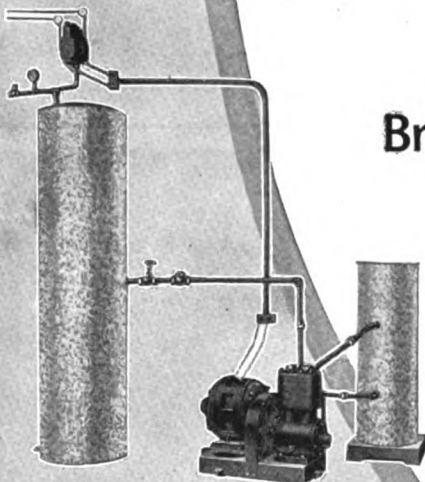
Sales Offices:

Utica, N. Y.

Cincinnati, Ohio

Kansas City, Mo.

ASK AN ENGINEER!

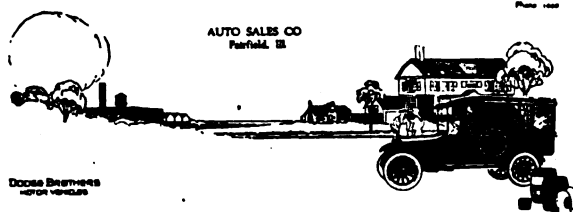


More than a Piston Ring

⁷ ZELNICKER *Ever-Tyte* The Piston Ring for All Engines

**is a real
fuel and
oil saver**

Decreased consumption of gasoline and oil always follows the installation of EVER-TYTES. Their construction positively prevents leakage and compression losses. The car owner gets 100% power from the fuel consumed.



April 18, 1921.

Ever-Tyte Piston Ring Division,
Walter A. Zelnicker Supply Co.,
St. Louis, Mo.

Gentlemen:--

About a year ago we installed a set of your rings in a Dodge car that was losing compression and pumping oil badly. Afterwards, on a test run we used only 11 gallons of gasoline, 1 quart of oil and 3 pints of water in 209 miles. This car is still performing nicely and we have had no fouling of plugs.

Yours truly,

Auto Sales Company.

EVIDENCE BOOKLETS 10 VOLUMES

If you have received none, send for one, stating kind of unit in which you are interested.

EVER-TYTE PISTON RING DIVISION
WALTER A. ZELNICKER SUPPLY CO.
Wellston St. Louis



A Greater and Lasting Demand for SPEE-DEE

will be created by our advertising campaign in 2600 newspapers combined with the Saturday Evening Post and Literary Digest

The ever growing use of SPEE-DEE proves that a big, comprehensive, national advertising campaign will create a tremendous increase in SPEE-DEE sales for our dealers. 2600 selected newspapers, supplemented by the two most widely read magazines in America, will soon be telling millions about the merits and uses of SPEE-DEE. Through this campaign a greatly increased demand will be created and the demand will be permanent because everyone who purchases a can of SPEE-DEE will find it so satisfactory that they will be back again and again for more.

What SPEE-DEE Will Do

There are a number of uses for which SPEE-DEE excels. Car owners, drivers and mechanics appreciate the smooth quick cleansing of the hands with SPEE-DEE—no water necessary, no grit, no acid or lye. SPEE-DEE is unequalled for cleaning seat covers and celluloid side curtains. ¶ In the home SPEE-DEE has numerous uses including cleaning rugs, carpets, woodwork, walls and clothes.

DEALERS—You can cash in on this big national advertising campaign by displaying SPEE-DEE. Write immediately for Special Introductory Offer and dealer selling helps.

States Chemical Co., 680 W. Austin Ave., Chicago, Ill.



